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ABSTRACT

This document presents a demographic analysis of data on education in the United States from 1940 through 1983. In summary the findings are as follows: (1) there has been a very large increase in educational attainment since 1940 and Americans are substantially more educated than people in other developed nations. (2) Benefits to society were found in reduced inequalities in attainment and contributions to economic growth. (3) The lack of decline in individual income inequality does not necessarily imply that increases in education do not have significant effects on the earnings of individuals attaining that education. (4) Surveys of the achievement score trends showed that there seems to have been a sizeable decline since the mid-1960s as well as large and persisting differentials by various socioeconomic groups. (5) The quality of schooling seems to have declined in the 1970s, and the current "back to basics" movement does not seem very promising. (6) The survey of resource use and education costs discovered a very sharp rise in cost per student in both elementary and secondary schools starting in the early 1960s. (7) The analysis of college education and the economy found that the pecuniary return on college education has declined beginning in the late 1960s; however, recent movements in data on income and occupation, cross-classified by educational attainment, suggest that the positive impact of college education may be on the rise. The report includes extensive statistical tables and figures summarizing the data. (CG)

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SPECIAL DEMOGRAPHIC ANALYSIS

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Education in the United States: 1940-1983

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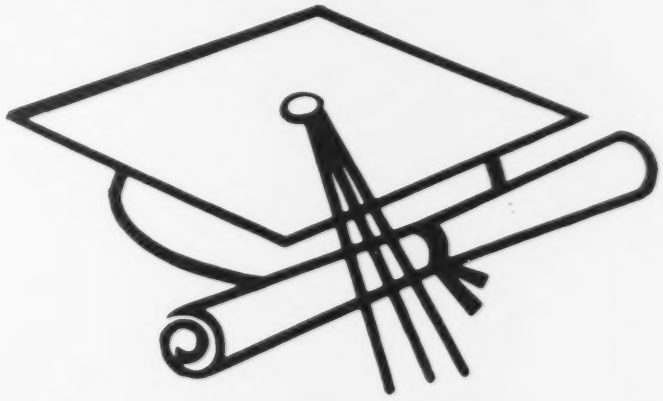

U.S. Department of Commerce
BUREAU OF THE CENSUS

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Preface

This report is another in a series of analytic studies from the Census Bureau's Center for Demographic Studies. The purpose of these publications is to provide perspective on important demographic and socioeconomic trends and patterns. Most of these analyses bring together data from several sources and attempt to enhance the use of Census Bureau data by pointing out the relevance of the statistics for current and prospective policy concerns. A distinguishing feature of the studies is the presentation of interpretive analyses and hypotheses offered by the authors as aids in identifying the factors underlying change.

Dave M. O'Neill is Assistant Chief for Socioeconomic Studies in the Center for Demographic Studies. After receiving his Ph.D. in Economics from Columbia University, Dr. O'Neill served on the faculty at the University of Pennsylvania. Since the late 1960's, however, he has specialized in policy research on social and economic issues related to the labor market, and in issues of economic measurement at public and private research organizations in Washington, D.C. He has published articles and monographs on a wide variety of socioeconomic topics including unemployment, aid to the handicapped, and the all-volunteer military.

Peter Sepielli is a statistician on the staff of the Center for Demographic Studies. After receiving his degree from Gallaudet College in 1972, he worked for several years in their Office of Demographic Studies. Since joining the Census Bureau in 1976, Mr. Sepielli has worked extensively in the development and reporting education statistics.

The author would like to thank Edward Dean of the Bureau of Labor Statistics and Theodore G. Clemence and William P. Butz of the Census Bureau for helpful comments and suggestions. Mr. Vance Grant of the National Center for Educational Statistics was very helpful in supplying some unpublished NCES data. Typing and statistical assistance was provided by Darlene Young and Thomas Cochran.

This study draws on statistics that are collected by a variety of agencies—the National Center for Educational Statistics, the National Educational Assesment, the Census Bureau, and others. The source citations in the text do not always refer to the primary data sources, but to secondary source compilations like the *Statistical Abstract of the United States* and *The Digest of Educational Statistics*.

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Chapter 1.
Introduction

Formal education, as a source of literacy and common cultural and political values, has long been an important object of social policy. However, in recent times, society's expectations of the benefits from formal education have broadened greatly.

Elementary and secondary education is expected to provide the cognitive skills that are required to absorb further schooling or training. The importance of college education to economic success has been increasingly stressed. Since the Russian launching of Sputnik in the 1950's, the adequacy of our college's contribution to advances in technology has been a concern. And finally, in recent decades, formal education has been viewed as a mechanism to promote equality of opportunity.

With all these expectations, it is perhaps no surprise that concern about our educational system has been growing. A number of specific developments have been noted.

The outcomes of elementary and secondary education as measured by achievement scores have declined, and large inequalities in achievement scores across socioeconomic groups persist. Rising costs of education at all levels have come under public scrutiny, and have met taxpayer resistance. Moreover, the benefits of higher education as they relate to both individual economic opportunity and to overall technical progress in the economy, have been questioned. Numerous magazine articles and editorials pose the question: "Do we have too many college graduates?"

Although these current issues and problems are significant and are based on real shortcomings and inefficiencies, the long run positive contributions that education has made to our social and economic development are also important and should not be overlooked. This report documents changes over time in various measures that are related to both the broad contribution and the current issues.

Chapter 2 traces the large increase in educational attainment between 1940 and 1982 and the accompanying reduction in inequality of attainment. The relationship between rising levels of education and economic growth is also detailed.

Chapter 3 first presents data on trends and differentials in achievement scores of American high school students. This survey provides background on the question of whether or not there has been a decline in the quality of elementary and secondary schooling. The findings of a number of analytical studies that have focused on this question are also presented. The conclusion is that the statistical evidence appears to support the popular notion that the quality of schooling has declined, especially during the 70's.

Chapter 4 surveys the trends in resource use and costs in both elementary and secondary schools and in colleges. A sharp uptrend in costs per student for public elementary and secondary schools that began in the early 60's is observed. The causes of the increase are analyzed and its severity assessed by comparisons with changes in the average family's ability to pay. The outlook for enrollments in lower and higher education in the near and long term are analyzed.

Chapter 5 analyzes the relationship between college education and the economy. Evidence on the change in the monetary gain from a college education from the mid-50's to the mid-70's is discussed. A long swing in the pecuniary return appears to have occurred over this period, as concerns about "underinvestment in college education" in the late 50's and mid-60's, gave way to concerns about overinvestment in the late 60's and early 70's. Although, some observers maintain that the pecuniary return to college education will remain low in the next decade, our analysis of current data on income and earnings of college and high school graduates suggests that the return to college education may actually be rising again.

Finally, chapter 6 presents a summary of findings and discusses some implications of the findings.

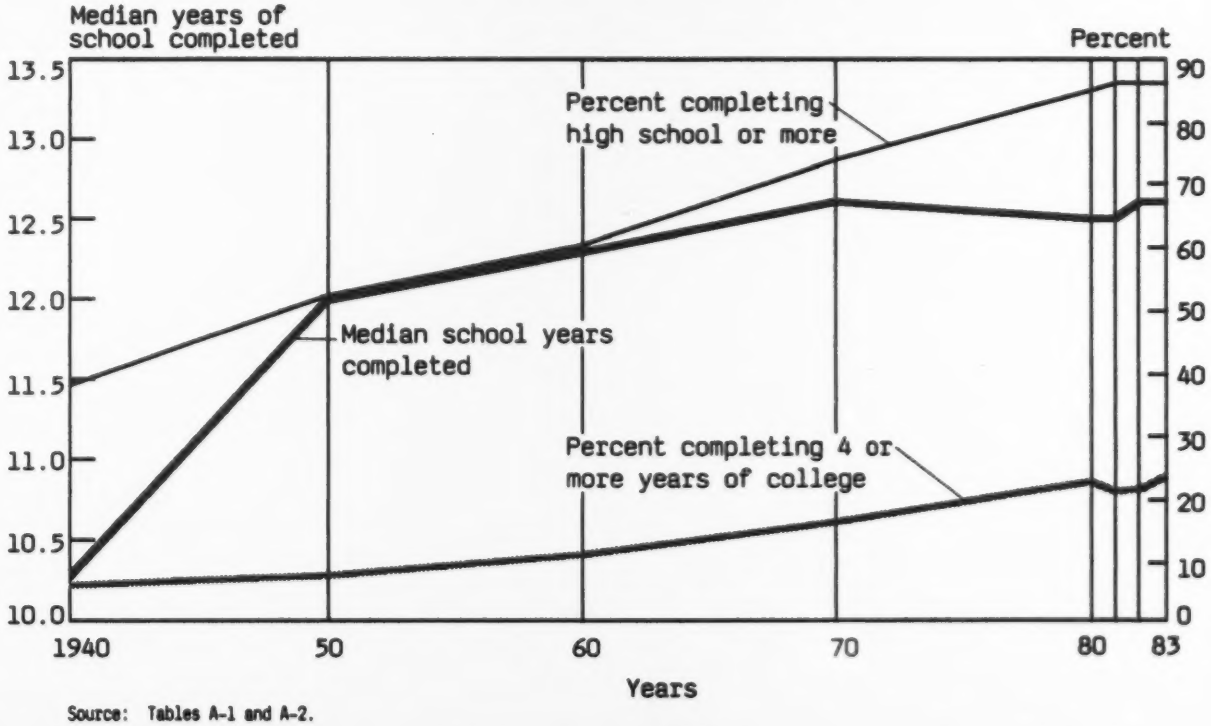
Chapter 2. Growth in Educational Attainment: 1940-82

Between 1900 and 1940, the rudiments of reading and writing were spread throughout almost the entire population of the United States. In 1900, the illiteracy rate was 11.3 percent and by 1940 it had fallen to 4.0 percent. Educational attainment also increased over this period—the percent of the population 25 and over with less than 5 years of schooling fell from 23.8 percent in 1910 to 13.4 in 1940. The pace of growth in attainment has greatly accelerated since 1940 and the social and economic benefits of this growth, although difficult to specify and measure precisely, have almost certainly been of great significance to society.

GROWTH IN ATTAINMENT

It is perhaps surprising to find that less than 45 years ago only 38 percent of young adults (25 to 29 years old) had attained a high school diploma or more. Put differently, in 1940 a solid majority of young adults were either high school dropouts or had never gone beyond elementary school. Today, the percent with high school graduation or more stands at 86 percent and high school dropouts have been reduced to a small minority. The corresponding figures for young adults with a college degree or more also showed a very large increase—from 6 percent to 22 percent (figure 2-1).

FIGURE 2-1.
Median School Years Completed by Persons 25 to 29 Years Old, Percent Completing High School or More, and Percent Completing 4 or More Years of College by Persons 25 to 29 Years Old: 1940-83



Source: Tables A-1 and A-2.

These are very large trends, and they have made the American people the most educated in the world (table 2-1). Clearly the U.S. has provided significant amounts of formal education to most of its population. But what is the significance of this growth? Although education produces important effects through many channels, two of the more important ones are reductions in inequality in educational attainment and greater economic growth.

Table 2-1. International Comparisons of Educational Attainment: Percentage of Population 25 Years Old and Over Who Had Attained at Least Some College Education[1]: 1980-81 and 1970-72

Country	Year of survey[2]	
	1980-81	1970-72
United States	31.9	21.3
Japan	14.5	5.5
Canada	17.2	17.8
Norway	11.8	(NA)
East Germany	17.3	8.5
Hungary	7.0	5.1
West Germany	(NA)	4.3
Austria	(NA)	2.6
Belgium	(NA)	2.6
Sweden[3]	15.5	8.3
Switzerland	(NA)	2.9

[1]Because of differences in definitions of levels of schooling some of the small differences between countries other than the U.S. may not be reliable, and some of the large differences with the U.S. may overstate somewhat real attainment differentials.

[2]Because of changes in survey techniques, comparisons over time for countries other than the United States may be unreliable.

[3]Percent of population 25-59 in 1970 and 20-64 in 1981.

Sources: United States, 1980 and 1970, U.S. Bureau of the Census, *Statistical Abstract of the United States: 1984*, (104th ed.) Wash., D.C., 1983, table 223.

Sweden 1981, *The AKU February 1981 Survey*, National Central Bureau of Statistics, Sweden.

All other countries and years:

1980-81 *Demographic Yearbook: 1983*, Department of International Economic and Social Affairs, Statistical Office, United Nations, New York, 1985, table 38.

1970-72 *Compendium of Social Statistics: 1977*, United Nations, New York, 1980, table III.33.

REDUCTION IN INEQUALITIES

Sociologists have long observed that great inequality in educational attainment can contribute to social tensions in much the same way as excessive income inequality, by fostering elitism, class differences, and political instability. Indeed at one time a college education was a mark of rank and social standing, as well as of acquired knowledge and skill. The situation in 1940 was not near this extreme, as some able children from poor families had been attending colleges for some time. Still, the lack of even a high school diploma by many was striking and the relative number going to college was small. The growth in attainment that was to take place would change this situation. It would bring with it a decrease in the amount of inequality in educational attainment. Trends in inequality are examined in several ways—among individuals; across States; and by racial, age, and sex groups.

Table 2-2 shows the distribution of the population 25 years old and over by years of school completed for 1940 and 1982, along with measures of the amount of variance or inequality in the distribution. Because there is a practical upper limit on the amount of formal education an individual can obtain, we expect that as more and more people attain higher levels, the closer together they would become. However, it is important to measure the degree to which this is happening so that judgments can be made about how important the reductions are and comparisons can be made in different places and times.

Measures of absolute inequality (standard deviation, interquartile range) are essentially based on the absolute difference in years of attainment between individuals, while measures of relative inequality (coefficient of variation, relative interquartile range) are essentially averages of the percentage differences in attainment between individuals. When everyone's attainment level is rising, it is possible for the measures of relative inequality to decline even though the measures of absolute inequality are constant or even rising. However, as table 2-2 shows, measures of both relative and absolute inequality declined significantly. The interquartile range shows that the range of attainment across the middle 50 percent of the population was 5.7 years of schooling in 1940 but only 3.5 years in 1982.

Inequality in attainment across States also narrowed. Table 2-3 shows the percent of the population 25 years old and over in each State who had attained a high school diploma or more for 1950 and 1980, along with measures of inequality in this statistic across States. The States have clearly become closer together in attainment in a relative sense, although there was only a small decline in absolute inequality between them.

In 1940, the Black/White ratio of median years of schooling completed was 0.65; by 1982, it rose to 0.96 (top panel figure 2-2). This progress by Blacks reflected their relative gains in high school completion (bottom panel, figure 2-2). Among 25- to 29-year-olds in 1940, the percentage who were high school graduates or more was 11.6 for Blacks and 40.5 for Whites. By 1982, Blacks in this age group had 81 percent with high school graduation or more and Whites 87.5 percent. Although a racial gap in scholastic achieve-

Table 2-2. Years of School Completed by Persons 25 Years Old and Over and Measures of Dispersion*: 1940 and 1982

1940**	Less than 5 years	5 to 7 years	8 years	9 to 11 years	12 years	13 to 15 years	16 years and over
Percentage distribution:	13.7	29.1	17.5	15.1	14.3	5.5	4.8
Median (years)	8.4						
Standard deviation (years)	3.8						
Interquartile range (years)	5.7						
Coefficient of variation (percent)	43.9						
Relative interquartile range (percent)	67.8						

1982	Less than 5 years	5 to 7 years	8 years	9 to 11 years	12 years	13 to 15 years	16 years and over
Percentage distribution:	3.0	5.6	7.1	13.3	37.9	15.3	17.7
Median (years)	12.6						
Standard deviation (years)	3.4						
Interquartile range (years)	3.5						
Coefficient of variation (percent)	26.9						
Relative interquartile range (percent)	26.9						

*The standard deviation is the square root of the average of all the deviations of the observations from the mean of the distribution. The interquartile range is the difference between the 75th percentile attainment level and the 25th percentile value. The coefficient of variation is the standard deviation divided by the mean; and the relative interquartile range is the interquartile range divided by the median.

**Percentages for the categories 5 to 7 years and 8 years for 1940 are estimated from 1940 census data that is shown in the categories 5-6 years and 7-8 years, by assuming that the individuals are uniformly distributed throughout the intervals.

Sources: 1982, U.S. Bureau of the Census, *Statistical Abstract of the United States: 1984,* (104th ed.) Wash., D.C., 1983, table 223. p. 144.

1940, U.S. Bureau of the Census, *Census of Population of the United States, 1940, Volume II, Characteristics of the Population by States, Part I, U.S. Summary and Alabama-District of Columbia,* table 13, p. 40.

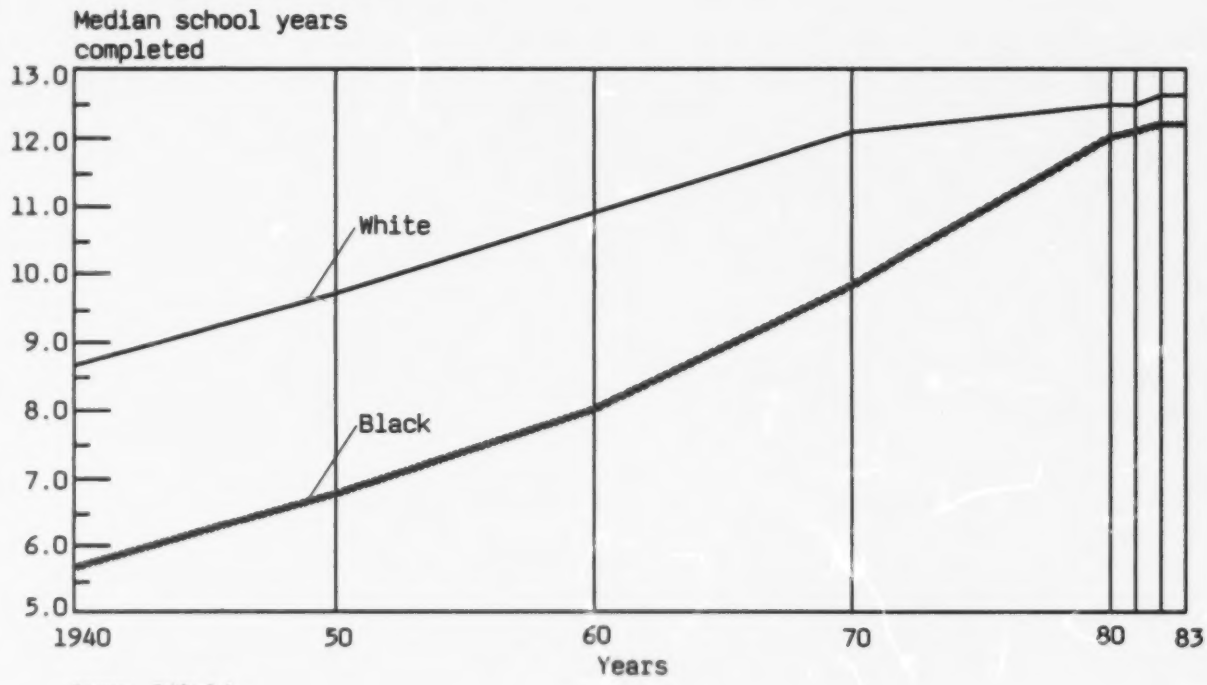
ment within attainment levels still persists, the sharp narrowing in attainment may have contributed to the narrowing in the racial earnings gap that took place over this period.

Figure 2-3 shows trends in attainment by sex. Historically, men and women have differed primarily with respect to college education. In 1940, men and women were close to equal but at a very low level of college attainment. Between 1940 and 1970 both sexes increased their college attainment, but men's gains were significantly greater. However, from 1970 on, the college attainment gains of women significantly outstripped those of men, with the result that by 1981 young adult women had almost caught up with young adult men. Men (25 to 29 years old) had 23.1 percent with college graduation or more while women had 19.6 percent. In addition, some of the more important sex differences in courses and degree fields taken in college narrowed over the 70's (table 2-4). In the two most important fields for men ("business and management" and "social science"), the gap in representation narrowed—especially in the business field. In the field of "education," one of the traditionally female fields, the representation of men rose relative to women, although the whole field declined in importance. The shifts in male-female differentials in college specialties reflects the changes taking place in the labor market as more women choose to pursue careers in nontraditional fields.

A narrowing in differential attainment by age has also taken place. The cohorts that were 25 to 29 and 45 to 54 years old in 1950 had a greater attainment gap between them than these same two age groups did in 1982. In 1950, the younger group had 52 percent with high school graduation or more and the older group had only 28 percent. By 1982, the absolute differential had narrowed to 15 percentage points—86 percent versus 71 percent. One important effect of this narrowing was to create pressure for a widening of the observed earnings differentials between young and old workers when the data are averaged over all education categories at each level. It is important to recognize this effect of educational trends on earnings differentials by age to avoid mistakes in interpreting the effects of changes in other factors on the age-earnings structure. The most important of these other factors in recent times has been the coming of age of the baby-boom generation. In the last 10 years, the influx of large numbers of young people in the labor force has also put downward pressure on the wages of young people relative to older workers.

FIGURE 2-2a.

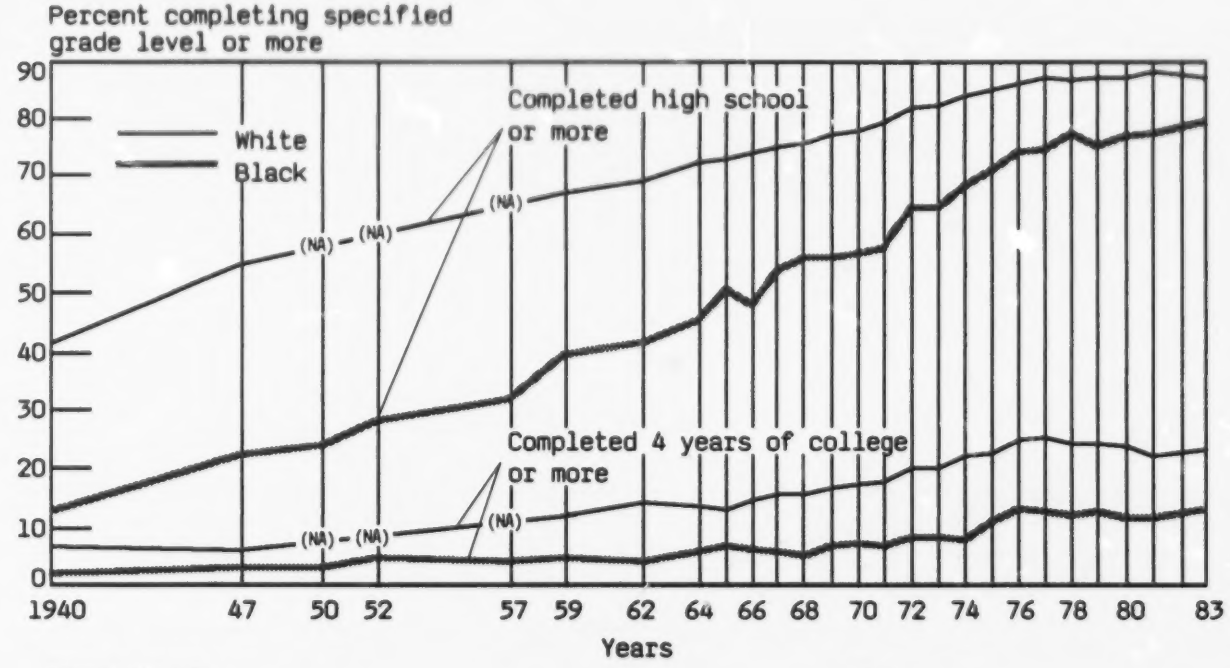
Educational Attainment for Persons 25 Years Old and Over, by Race: 1940 – 83



Source: Table A-1.

FIGURE 2-2b.

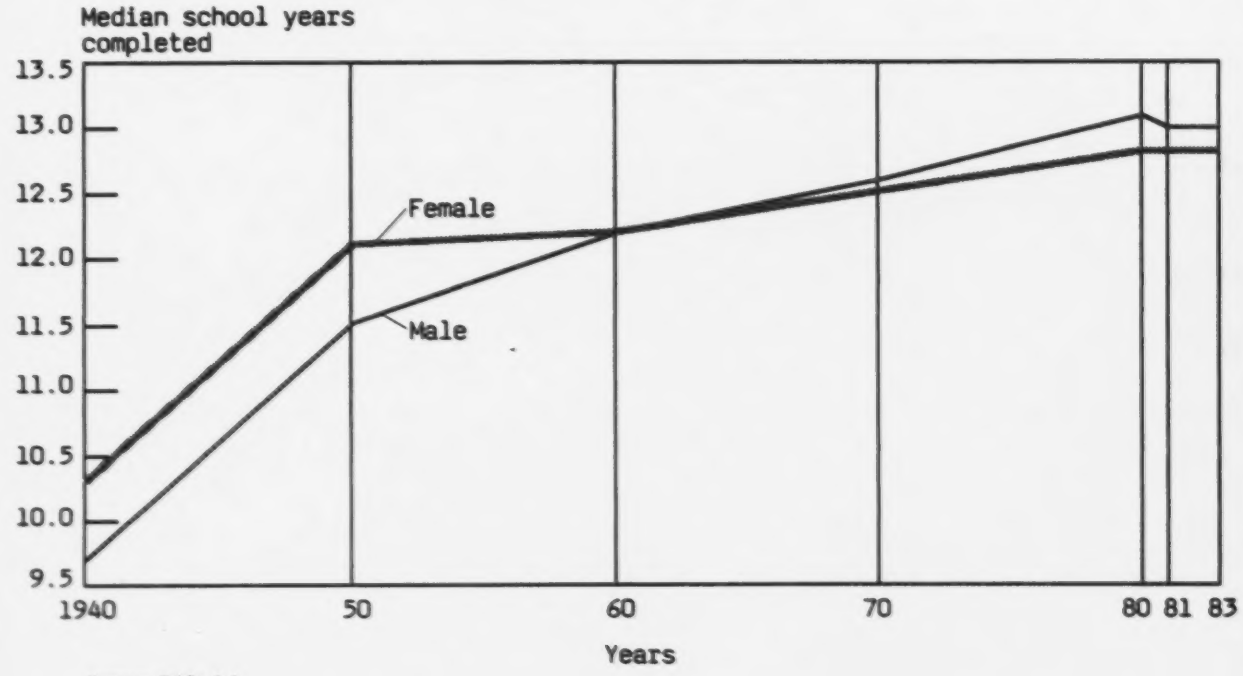
Educational Attainment for Persons 25 to 29 Years Old, by Race: 1940 – 83



Source: Table A-2.

FIGURE 2-3a.

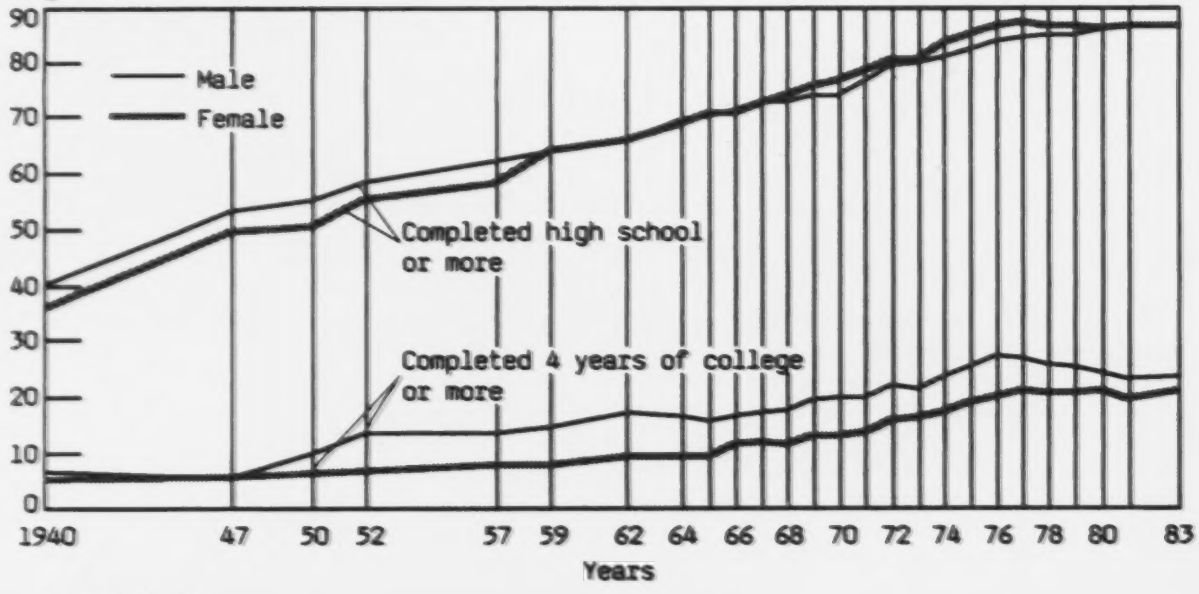
Educational Attainment for Persons 25 to 34 Years Old, by Sex: 1940 – 83



Source: Table A-1.

FIGURE 2-3b.

Educational Attainment for Persons 25 to 29 Years Old, by Sex: 1940 – 83



Source: Table A-2.

Table 2-3. Percent With High School Graduation or More, 25 Years Old and Over, by State: 1950 and 1980

Geographic area	1950	1980	Geographic area	1950	1980
Maine	36.9	68.7	North Carolina	20.4	54.8
New Hampshire	36.1	72.3	South Carolina	18.5	53.7
Vermont	36.8	71.0	Georgia	20.3	56.4
Massachussetts	41.5	72.2	Florida	34.8	66.7
Rhode Island	30.7	61.1	Kentucky	21.9	53.1
Connecticut	36.1	70.3	Tennessee	24.3	56.2
New York	34.7	66.3	Alabama	21.1	56.5
New Jersey	33.8	67.4	Mississippi	21.5	54.8
Pennsylvania	31.2	64.7	Arkansas	21.2	55.5
Ohio	35.6	67.0	Louisiana	21.7	57.7
Indiana	35.1	66.4	Oklahoma	32.9	66.0
Illinois	34.1	66.5	Texas	29.9	62.6
Michigan	34.0	68.0	Montana	38.7	74.4
Wisconsin	33.1	69.6	Idaho	40.1	73.7
Minnesota	34.7	73.1	Wyoming	42.4	77.9
Iowa	37.5	71.5	Colorado	42.5	78.6
Missouri	29.7	63.5	New Mexico	34.0	68.9
North Dakota	30.4	66.4	Arizona	37.7	72.4
South Dakota	34.2	67.9	Utah	48.8	80.0
Nebraska	38.4	73.4	Nevada	45.4	75.5
Kansas	39.2	73.3	Washington	43.8	77.6
Maryland	30.8	67.4	Oregon	42.1	75.6
Washington, D.C.	47.8	67.1	California	46.1	73.5
Virginia	28.2	62.4	Alaska	44.8	82.5
West Virginia	24.4	56.0	Hawaii	32.1	73.8

ADDITIONAL DATA

Mean percent with high school graduation or more (unweighted)	33.8	67.4
Standard deviation of percent with high school or more (unweighted)	7.7	7.4
Coefficent of variation (standard deviation divided by mean x 100)	22.8	11.0

Source: U.S. Bureau of the Census, *Statistical Abstract of the United States: 1960*, (81st ed.) Wash., D.C., 1960, table 143, p. 111 and *Statistical Abstract of the United States: 1984* (104th ed.) Wash., D.C., 1984, table 224, p. 145.

Before turning to the effects of education on economic growth, it is important to note that one important economic inequality, inequality in income across individuals, did not decline pari passu the decline in inequality in educational attainment across individuals shown in table 2-2. Indeed as figure 2-4 and table 2-5 show the amount of income inequality has drifted up somewhat since 1947. Note that the statistic in table 2-5 is a measure of relative inequality, so that the upward trend in prices would not in itself cause the measure to increase.

Some observers argue that the lack of decline in income inequality, in spite of the narrowing in attainment, proves that education is a poor device for improving the economic status of those from low socioeconomic backgrounds.[1] However, this argument overlooks the complexity of the relation between income inequality and attainment inequality. Other factors besides schooling (such as ability, family connections, other investment in human capital, labor market and demographic changes, luck, and so on) also influence earnings inequality among individuals. Many of these factors interact strongly with schooling. For example, the education of an able youth will raise his income by much more than that of a less able youth.[2] In general, more able individuals have a greater pecuniary incentive to attain more education. This means that as access to more and higher quality education spreads to children from all family income levels, the positive correlation between ability and attainment across individuals increases, and this factor alone will

[1] Christopher Jencks put forth this view in his well known book, *Inequality: A Reassessment of the Effect of Family and Schooling in America*, (Basic Books Inc., New York, London, 1972).

[2] In this context, "ability" refers to differences individuals bring into the classroom, whether they are "intelligence," preschool environment, or other factors.

Table 2-4. Earned Bachelor's Degrees Conferred, by Field of Study and Sex: 1972 and 1980

Excluding Medical, Dental, and Law Degrees

(Percent distribution. Totals may not sum to 100.0 because of rounding)

Field of study	1972		1980	
	Male	Female	Male	Female
Total	504,958	386,527	473,600	455,800
Agriculture	2.5	0.2	3.4	1.5
Architecture	1.1	0.2	1.4	0.5
Area studies	0.3	0.4	0.2	0.3
Biological science	5.2	2.8	5.7	4.3
Business and management	21.8	3.0	26.2	13.7
Communications	1.6	1.1	2.9	3.3
Computer and information science	0.6	0.1	1.6	0.7
Education	9.8	36.6	6.5	19.1
Engineering	9.8	0.1	13.2	1.4
Fine and applied arts	2.7	5.2	3.2	5.7
Foreign language	0.9	3.6	0.6	1.8
Health professions	1.9	5.6	2.4	11.5
Home economics	0.1	3.0	0.2	3.8
Letters	5.8	11.4	3.5	5.3
Library science	–	0.2	–	0.1
Mathematical subjects	2.6	2.4	1.4	1.1
Military science	–	–	–	–
Physical science	3.4	0.8	3.8	1.2
Psychology	4.6	5.1	3.3	5.8
Public affairs	1.3	1.5	3.6	4.5
Social science	19.9	14.8	12.4	9.9
Theology	1.6	0.3	1.0	0.3
Miscellaneous	2.1	1.3	3.6	3.8

–Less than 0.1 percent.

Source: U.S. Bureau of the Census, *Statstical Abstract of the U.S.: 1982-83* (103rd ed.) Wash., D.C., 1982, p. 167, table 278, and *Statistical Abstract of the U.S.: 1975* (96th ed.) Wash., D.C., 1975, p. 142, table 289.

make for increased inequality of income.[3] Therefore increased access to education will not necessarily reduce the observed amount of inequality in income, even though it is raising the income of all those who attain the additional education. However, increased access to education should have reduced the correlation between family income and connections, and the earnings and income levels that children subsequently achieve.

At any rate, it follows that a maior criterion to judge the benefits of increased educational attainment is whether it enabled people to significantly increase their earnings capacity. As we now show, there is evidence that these earnings effects have taken place along with the large increases in attainment.

EDUCATION AND ECONOMIC GROWTH[4]

Most observers believe that the large growth in educational attainment also made a significant contribution to the economic growth that took place over the same period.[5] To the economy, the growth in attainment meant a steady supply of highly skilled labor and reasonably rapid adjustments

[3] If Y = a + E then by a well known formula for the variance:

$$Var(Y) = Var(a) + Var(E) + 2*Sa*SE*PaE$$

where Var = Variance, S = standard deviation, PaE = correlation coefficient between a and E, Y = logarithm of income, a = logarithm of ability and E = logarithm of educational attainment. Thus the amount of relative inequality in the income distribution, Var(Y), is positively related to PaE, the amount of correlation between ability and educational attainment. For a detailed analysis see:

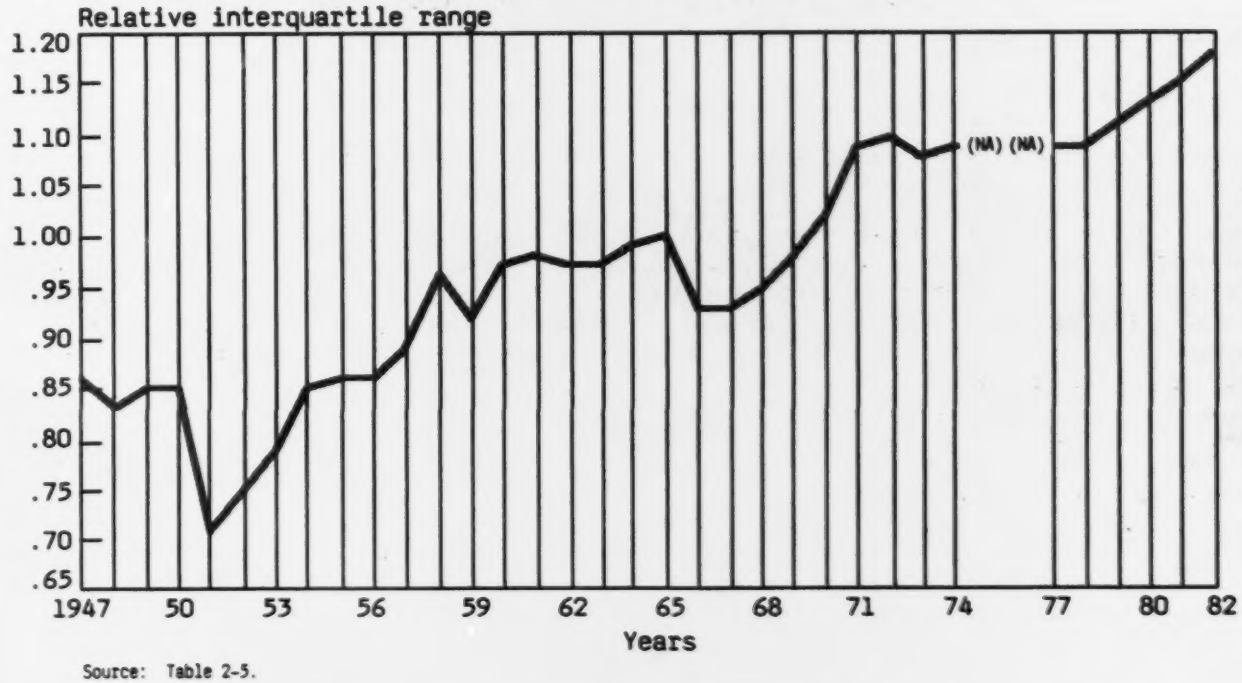
Gary Becker and Barry Chiswick, "Education and the Distribution of Earnings," *American Economic Review*, May 1966.

[4] This discussion focuses on the effects of education on economic growth as measured by the growth in the real earnings of labor and growth in the volume of goods and services sold in the market—i.e. the Gross National Product (GNP). However, there are many sources of material well being that are not fully reflected in market transactions—health, safety, quality of leisure time, working conditions, and so on. These factors can change without any change in the GNP, and many observers feel that education contributes significantly to some of them—e.g., health improves because educated people react more to the effects of lifestyle on health. However, we cannot cover this aspect in our report. See: Haveman and Wolfe, "Education, Productivity, and Well-Being: On Defining and Measuring the Economic Characteristics of Schooling," in Edwin Dean (Ed.), *Education and Economic Productivity*, (Ballinger, Cambridge, Massachusetts, 1984).

[5] The economics of education literature has grown to mammoth proportions since the pathbreaking work of Becker in 1957. There is no dispute, at least among economists, that education made a contribution to growth, but there is disagreement over the size of the contribution and the precise mechanism bringing it about. In chapter 5, more discussion is given. A review article by Marc Blaugh, "Human Capital Theory: A Slightly Jaundiced Survey," *Journal of Economic Literature*, Sept. 1976, Vol. XIV, #3, contains a useful bibliography.

FIGURE 2-4.

Relative Income Inequality in the Distribution of Wage and Salary Income for Males 14 Years Old and Over: 1947–82



Source: Table 2-5.

Table 2-5. A Measure of Relative Income Inequality* for the Distribution of Wage and Salary Income of Males 14 Years Old and Over: 1947-82

Year	75p–25p / Median	Year	75p–25p / Median	Year	75p–25p / Median
1947	0.86	1959	0.92	1971	1.09
1948	0.83	1960	0.97	1972	1.10
1949	0.85	1961	0.98	1973	1.08
1950	0.85	1962	0.97	1974	1.09
1951	0.71	1963	0.97	1975	(NA)
1952	0.75	1964	0.99	1976	(NA)
1953	0.79	1965	1.00	1977	1.09
1954	0.85	1966	0.93	1978	1.09
1955	0.86	1967	0.93	1979	1.11
1956	0.86	1968	0.95	1980	1.13
1957	0.89	1969	0.98	1981	1.15
1958	0.96	1970	1.02	1982	1.18

NA Not available in published form.

*The interquartile range divided by the median income. The 25th percentile income is subtracted from the 75th percentile income and the difference is divided by the median (i.e. 50th percentile) income. This measure will be sensitive to changes in inequality that affect the middle of the distribution.

Source: U.S. Bureau of the Census, Current Population Reports, Series P-60, *Income of Families and Persons in the U.S.*, for each year.

Table 2-6. Median Income of Male College Graduates, Male High School Graduates, and Those With Some High School, 25 to 34 Years Old, With Income During the Year: 1950-83

(Figures in current dollars)

Year	College graduates (1)	High school graduates (2)	Some high school (3)	Ratio (1)/(2) (4)	Ratio (2)/(3) (5)
1950	3,510	3,095	2,735	1.13	1.13
1958	5,970	4,688	4,275	1.27	1.10
1961	6,640	5,175	4,425	1.28	1.17
1963	6,947	5,612	4,903	1.24	1.14
1965	7,474	6,151	5,254	1.21	1.17
1967	8,762	6,882	5,922	1.27	1.16
1969	10,228	8,008	6,693	1.28	1.20
1971	10,908	8,556	7,331	1.27	1.17
1973	12,349	10,153	8,448	1.22	1.20
1975	13,232	10,767	8,241	1.23	1.31
1979	17,345	14,280	10,983	1.21	1.30
1981	20,589	15,393	11,173	1.34	1.38
1982	21,149	15,298	10,948	1.38	1.40
1983	21,988	15,789	10,711	1.39	1.47

Source: 1950, 1950 Census of Population, Special Reports, *Educational Attainment*, table 12; 1958-82, U.S. Bureau of the Census, Current Population Reports, Series P-60 *Income of Families and Persons in the U.S.* various issues, 1983 from forthcoming P-60 report.

in supply to the needs generated by the technical changes that went on over this period. Without the adjustment of skilled labor flows via education, the observed growth rate in worker-hour productivity would have been significantly less.[6] Some observers also argue that education makes an important direct contribution to technical change itself, via the improved skills of certain types of professionals—industrial managers, engineers, and scientists.

The main way that economists infer the contribution of education to the economy is by analyzing the earnings differentials between groups of individuals with different amounts of educational attainment—college graduates vs. high school graduates; high school graduates vs. less than high school; and so on. It is assumed that at least a part of these cross-sectional earnings differentials represent the influence of additional years of schooling as opposed to the effects of other factors correlated with educational-attainment-like ability. This part of the earnings differential is used to weight the growth in attainment and measure its contribution to aggregate growth. Also one would expect that if additional attainment growth over time were contributing significantly to the economy, then the earnings differentials would not decline, even though the relative numbers were shifting toward more and more attainment.

This, in fact, is what has happened. The income differentials between young college graduates, high school graduates, and those with only some high school attainment have not declined over the 1950-83 period (figure 2-5 and table 2-6), despite the large flow of people into the two graduate categories. Indeed the differential has trended up for high school graduates over those with some high school only, and for college graduates over high school graduates the ratio has turned up in the last few years. Since college graduates are usually less susceptible to cyclical swings in employment, some of the rise is due to the sharp recession over the period. However, income data restricted to individuals who worked at a full-time job for a full year also show a significant rise in the college/high school graduate earnings ratio, indicating longer run factors at work.[7]

Of course, it is still conceivable that all the growth in educational attainment was simply a byproduct of economic growth. On this view, the increased investment in education was of no more significance to economic growth than was the increased investment in homes and cars, by families, as their incomes grew. This argument is difficult to disprove since the "human capital" created by education is intangible compared to products bought and sold in the market like earthmovers, dump trucks, and other forms of physical capital.

A number of studies have shown that when independent measures of ability and other factors are held constant addi-

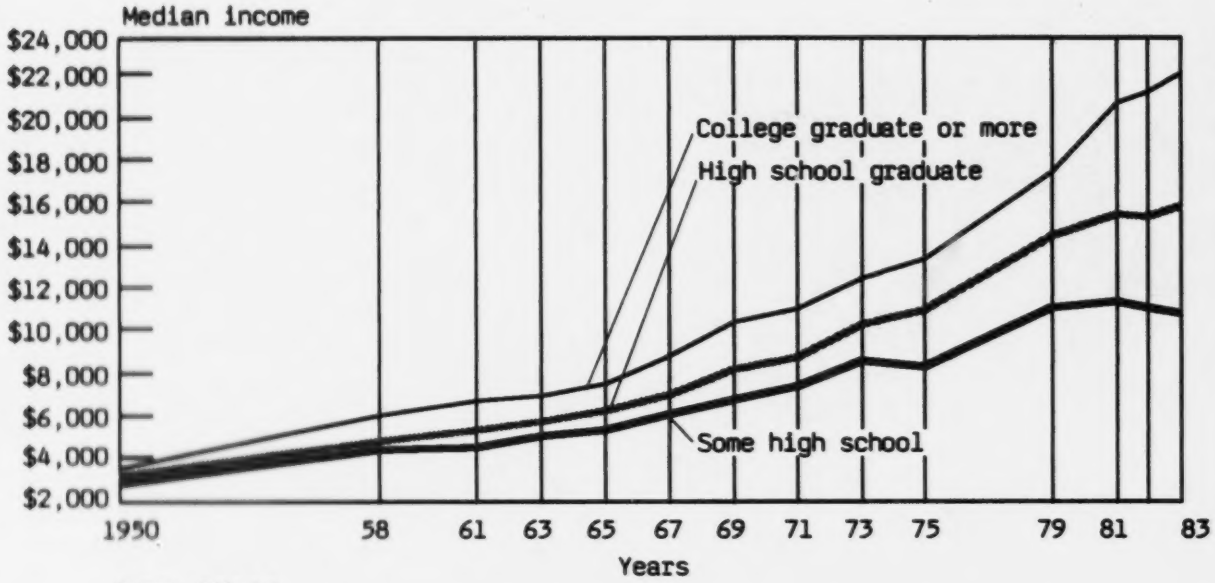
[6] There have been a number of major "growth accounting" studies that have attempted to quantify the contribution of various factors to U.S. economic growth. The work of Denison is perhaps the most widely cited. He found that over the period 1948-73 growth in education per worker contributed 0.5 percent to the annual growth in national income per worker. That is, over this period the average annual growth rate in national income per worker was 2.4 percent and it would have been 0.5 percentage points lower if there had been no growth in education per worker. Education's contribution amounted to about 17 percent of all the contributions of the positive sources of growth. Unfortunately these studies do not yet tell us how the other sources of growth, capital per person and technical change interact with education in the growth process. Thus we do not know what education would have contributed if it had increased by itself over this period. See: Edward Denison, *Accounting for Slower Economic Growth*, (The Brookings Institution, Washington D.C., 1979).

[7] See chapter 5.

FIGURE 2-5a.

Median Income Of Male College Graduates, High School Graduates, and Those With Some High School, 25 to 34 Years Old With Income During the Year: 1950 – 83

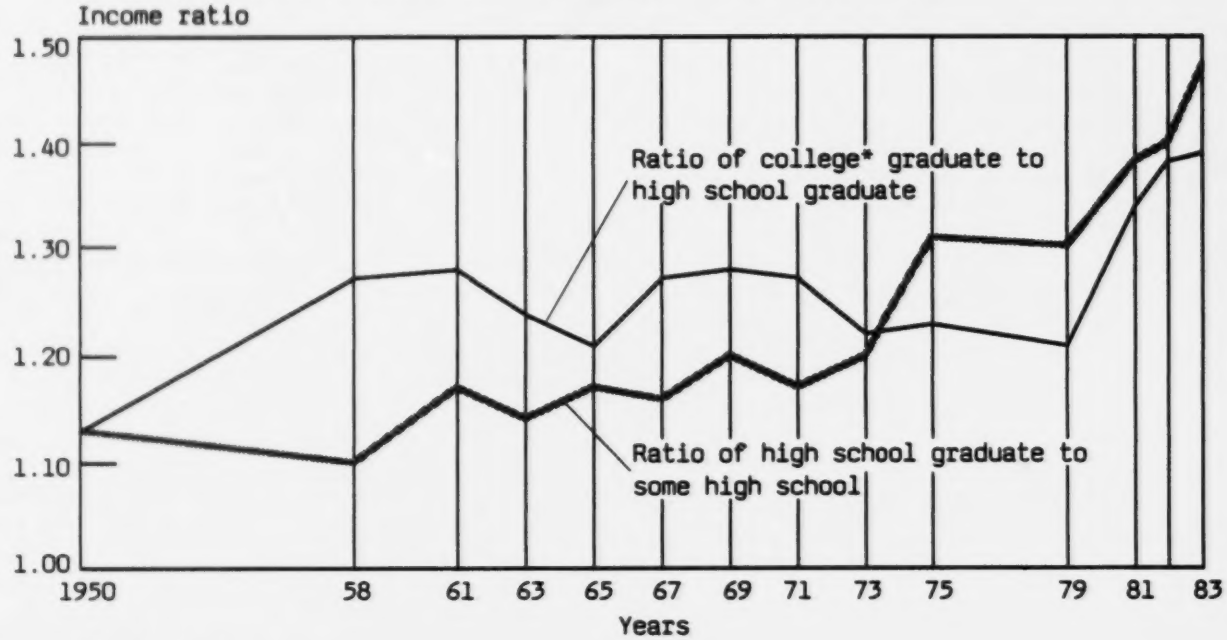
(Current dollars)



Source: Table 2-6.

FIGURE 2-5b.

Ratio of Median Incomes: College Graduate to High School Graduate and High School Graduate to Some High School: 1950 – 83



*Four or more years.

Source: Table 2-6.

tional years of schooling are still associated with higher earnings.[8] Also we observe a high degree of correlation between changes in labor-market demand for different occupations and changes in the mix of skill subsequently acquired by college graduates. These patterns strongly suggest that the increase in education was both relevant to the growth process and added to the earnings and income of those who sought to advance their skills through education. In sum, it is probably safe to attribute at least a part of the growth in output per worker-hour since 1940 to the growth in educational attainment since 1940.

[8] For example, Gary Becker, *Human Capital* (National Bureau of Economic Research, New York, 1957), Zvi Griliches and William N. Mason, "Education, Income and Ability," *Journal of Political Economy*, Vol. 80, #3, Pt. 2, May/June 1972; Dave M. O'Neill, "Voucher Funding of Training Programs: Evidence From the G.I. Bill," *Journal of Human Resources*, Vol. XII, #4, Fall 1977.

Chapter 3.
Educational Achievement: Trends and Differentials

Perhaps the most vocal debate in American education in recent years is about the quality of education being provided by our elementary and secondary schools. Two reports on the condition of U.S. elementary and secondary education have recently been released by high-level commissions, in which problems are highlighted and recommendations are made.

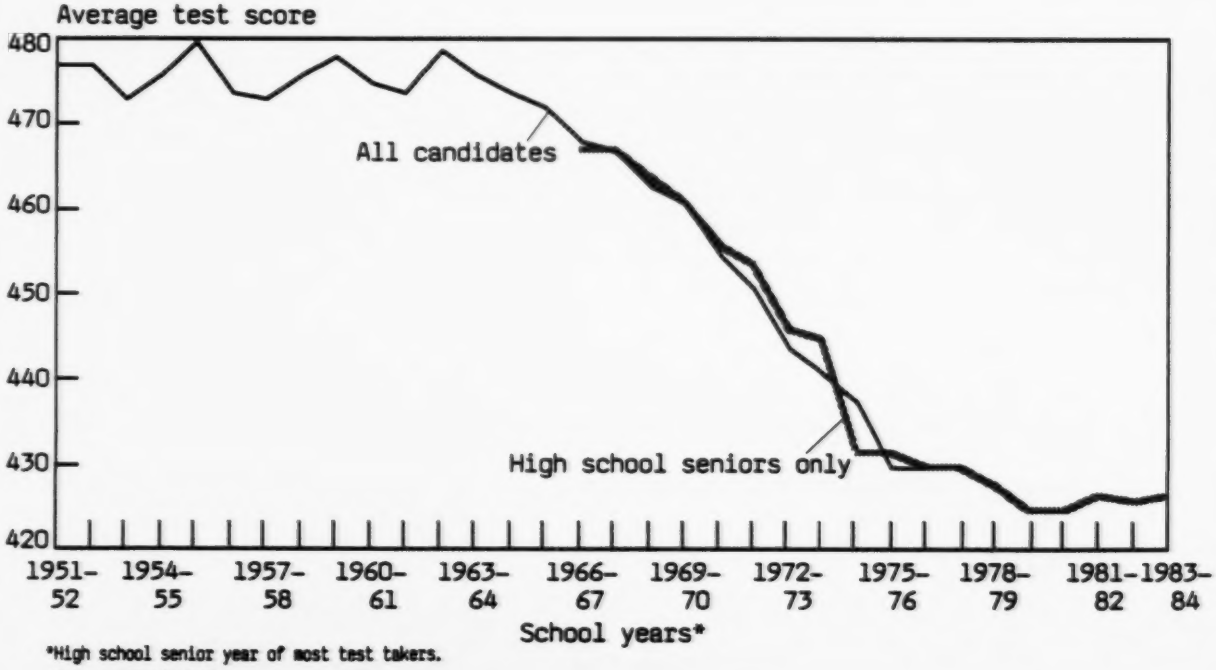
Concern about the quality of schooling is related to data on the scores from scholastic achievement tests of various kinds. It is the changes and patterns in these statistics both over time and between areas and socioeconomic groups, that has contributed to the growth of this issue.

Therefore this chapter first presents and analyzes data on trends and differentials in achievement test scores. Then an analysis of the question of whether there has been a decline in the quality of schooling is presented.

TRENDS AND DIFFERENTIALS IN ACHIEVEMENT

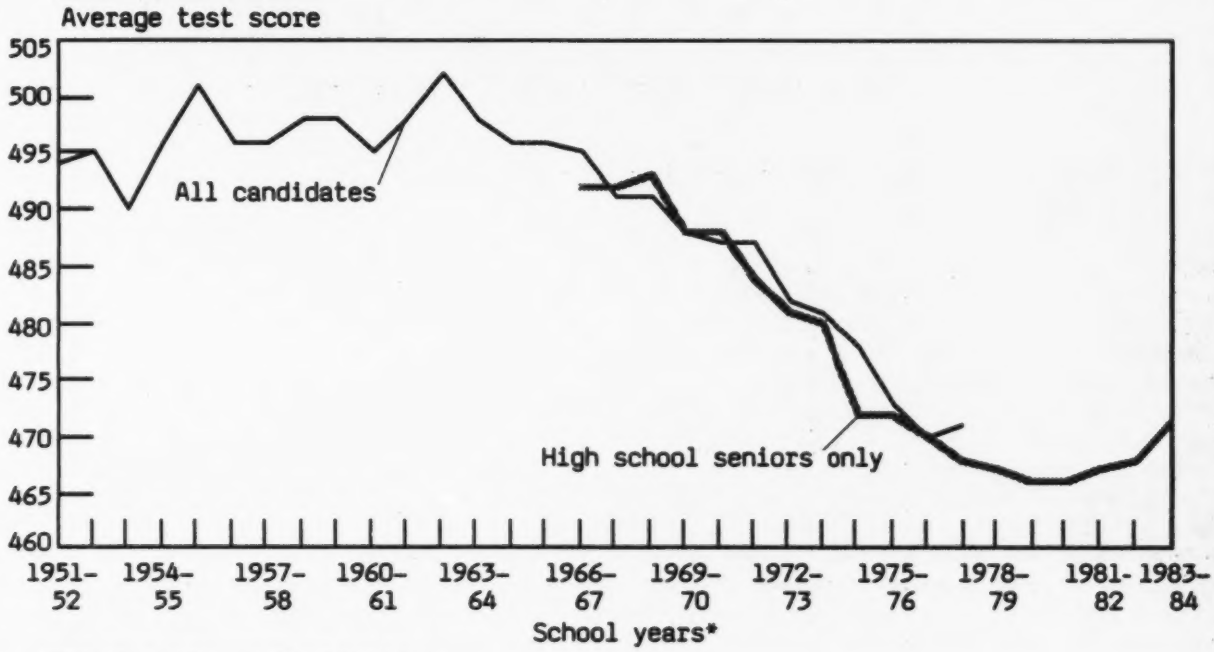
Most ideas about trends in the quality of schooling have come from observations on measures of pupil learning—achievement test scores. As these scores have declined, concern about school quality has increased. But the amount learned in school is effected by attributes the student brings to the school (e.g., I.Q., parental influences, etc.) as well as the qualities of the school itself (ability of teachers, educational philosophy, facilities, and so forth). Indeed, most of

FIGURE 3-1.
Scholastic Aptitude Test Score Means: 1951 – 52 to 1983 – 84
(Verbal Test Score)



*High school senior year of most test takers.
Source: Table A-3.

FIGURE 3-2.
Scholastic Aptitude Test Score Means: 1951–52 to 1983–84 (Math Test Score)



*High school senior year of most test takers.
Source: Table A-3.

the quantitative studies that have been done on the determinants of pupil achievement conclude that the student background factors are probably more important. Thus in assessing patterns in achievement data, it must be remembered that observed trends and differentials in test scores do not necessarily imply a corresponding trend or differential in the quality of schooling received. It could reflect a trend in the average level of student background factors.

Comprehensive data on achievement scores that go back many years are difficult to obtain. Unlike the data on attainment, comprehensive data on the achievement of all elementary and secondary school students only begins in the 70's. Figures 3-1 and 3-2 show what is probably the longest comprehensive series on the achievement of American high school students. It covers only high school graduates who are seeking to go on to college. Almost all these students take a test called the Scholastic Aptitude Test (SAT). The SAT is a combination ability and achievement test. It is influenced by a student's innate ability and aptitude as well as by how much he/she achieved in school.

The "SAT score decline" shown in figures 3-2 and 3-3 is by now widely known and has been extensively studied in search of the underlying causal factors. We discuss these studies in the next section, but it should be mentioned here that declines in the average ability level of students taking the SAT can only account for part of the SAT score decline. That is, a significant part of the decline is likely due to factors that were at least partially under the control of school—the style and content of textbooks, amount of homework assigned and completed, type of courses offered, and so on.

Another achievement test comparison that gives rise to concern with the overall performance of elementary and secondary schools is with other countries. The findings of a comprehensive survey of achievement test scores in a large number of countries in the early 70's has recently been published and reviewed by some experts in the field.[1] Table 3-2 presents rankings of test score results for the U.S. and some other developed countries.

An important distinction in table 3-1 is between the test scores for a sample of all high school seniors enrolled in academic curricula (POP I) and an estimate (for each country) of a subset of these seniors that represent students who entered school with equal underlying scholastic ability (POP II). The reason for this distinction is that the fraction of any cohort that remains in school to senior year in an academic curricula varies considerably from country to country. It is highly likely that this process of attrition is selective on scholastic ability so that, on the average, the more able

[1] Richard M. Wolf, *Achievement in America*, National Report of the U.S. for the International Educational Achievement Project, (Teachers College Press, Teachers College, Columbia University, New York, New York). Barbara Lerner, "American Education: How Are We Doing?" *Public Interest*, (Fall 1982) and Herbert Walberg, "Scientific Literacy and Economic Productivity in International Perspective," *Daedalus*, 112, No. 2 (Spring 1983).

Table 3-1. Rank Order of Achievement Test Scores by Subject and Population Group, for Selected Developed Countries and Subjects: 1970-71

Countries	Science		Reading comprehension		Literature		Civic education	
	POP I	POP II	POP I	POP II	POP I	POP II	POP I	POP II
Total countries with test results	14	13	12	12	8	8	7	7
Austria	3	2	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Belgium (Fr.)	13	11	6	4	6	5	(NA)	(NA)
Belguim (Fl.)	11	8	9	6	8	7	(NA)	(NA)
England	5	4	3	2	2	3	(NA)	(NA)
Finland	8	9	5	8	3	6	4	4
France	10	10	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Germany	2	11	(NA)	(NA)	(NA)	(NA)	2	6
Hungary	7	5	11	10	(NA)	(NA)	(NA)	(NA)
Ireland	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	7	7
Israel	(NA)	(NA)	8	7	(NA)	(NA)	(NA)	(NA)
Italy	12	13	10	12	7	8	(NA)	(NA)
Netherlands	4	(NA)	14	9	(NA)	(NA)	5	5
New Zealand	1	1	1	11	1	2	1	3
Romania	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)
Scotland	5	6	2	3	(NA)	(NA)	(NA)	(NA)
Sweden	9	3	7	5	4	4	3	1
United States	14	7	12	1	5	1	6	2

Note: POP I refers to all seniors enrolled in an academic curricula and POP II refers to a subset for these students as defined in the text.

Source: Richard M. Wolf, *Achievement in America,* (Teachers College Press, Teachers College, Columbia Univ., New York, London, 1977).

students remain in school. This means that in countries that have high attrition the test performance of seniors will be higher than in countries with low attrition, just because of the attrition factor—i.e., the schools in each country could be performing equally well.

The U.S. has the lowest attrition rate, with Sweden and Japan close to the U.S. The other developed countries have much higher attrition rates. Thus, the very poor showing of the U.S. on POP I score rankings is at least partly due to differential attrition. The data underlying the ranking for POP II incorporate an adjustment for the effects of differential attrition on test scores. However, the adjustment procedure is biased in favor of countries with low attrition—i.e., the U.S.—and it therefore overadjusts for the bias.[2] Thus the true relative ranking of the U.S. is somewhere in between the results for POP I and POP II.

[2] For the country with the lowest fraction retained (say xL percent), the POP II score is simply the POP I score. For all other countries, the POP II score is the score of only the top xL/xi percent of their students, ranked by test score result, where xi is the (higher) retention fraction of other countries. This procedure assumes that attrition is perfectly selective on scholastic ability. Since it is not perfect, it means that POP II students in high attrition (low retention) countries will have somewhat lower ability than the POP II students in the lower attrition countries. Thus the U.S., with the highest retention rate (about 9 times xL), is almost certain to have most of the actual top x percent of its scholastic ability distribution included in the POP II comparison, while for the lowest retention country, this is only possible if their attrition had been perfectly related to scholastic ability.

Comprehensive data on achievement trends for various socioeconomic subgroups are even more difficult to find. SAT scores for various ethnic/race groupings are available for the period 1976-83. They are shown in figures 3-3 and 3-4. There is definite narrowing of the differentials since 1976, but at a glacial-like pace. As of 1983, large differentials still remained.

These large differentials can represent both differences in the quality of schooling provided and in family and personal background factors. Currently this is an area of intensive research by social scientists and it is beyond the scope of this report to attempt any survey of the research findings. However, one aspect of these differentials is important to stress. This is with regard to interpreting color and ethnic differentials in economic statistics like earnings and unemployment. Most of the data on economic variables is classified by years of school completed only; information on achievement scores is seldom available jointly with economic variables. Because of this, the racial-ethnic differentials in economic variables at a given level of educational attainment may be attributed solely to the effects of labor market discrimination against the racial-ethnic groups. This interpretation assumes that each group is supplying the same quality of labor because they have attained the same number of years of schooling. However, our data on achievement differentials show that this may be an unwarranted

assumption. Some of the differential in earnings and unemployment may be related to the differential in achievement between the two groups.[3]

Up to now, the discussion has been in terms of the average test score level, either for everyone or for various subgroups. But concern has also been raised over the lower tail of the achievement distribution. That is, over young people who are not achieving even a minimal level of reading and arithmetic skills. A series of surveys of what is called "functional literacy" have been made. Functional literacy implies more than the traditional definition of literacy, which is usually defined as the ability to read and write in one's native tongue. As table 3-2 shows, illiteracy defined in the traditional way has, for all practical purposes, been eliminated. But the functional literary concept specifies some minimal level of ability in reading, writing, and calculating. It is a level that enables an individual to function at some minimal level in the labor market of a modern economy.

One assessment of the functional literacy of teenagers was the Mini Assessment of Functional Literacy (MAFL) conducted in 1974 by the National Assessment of Educational Progress. This test, which was administered to a nationally representative sample of 17-year-old students, was specifically designed to measure the extent of functional literacy among the population. The National Right to Read Effort, which commissioned the study, determined that students who failed to answer correctly 75 percent of the exercises would be considered functionally illiterate.

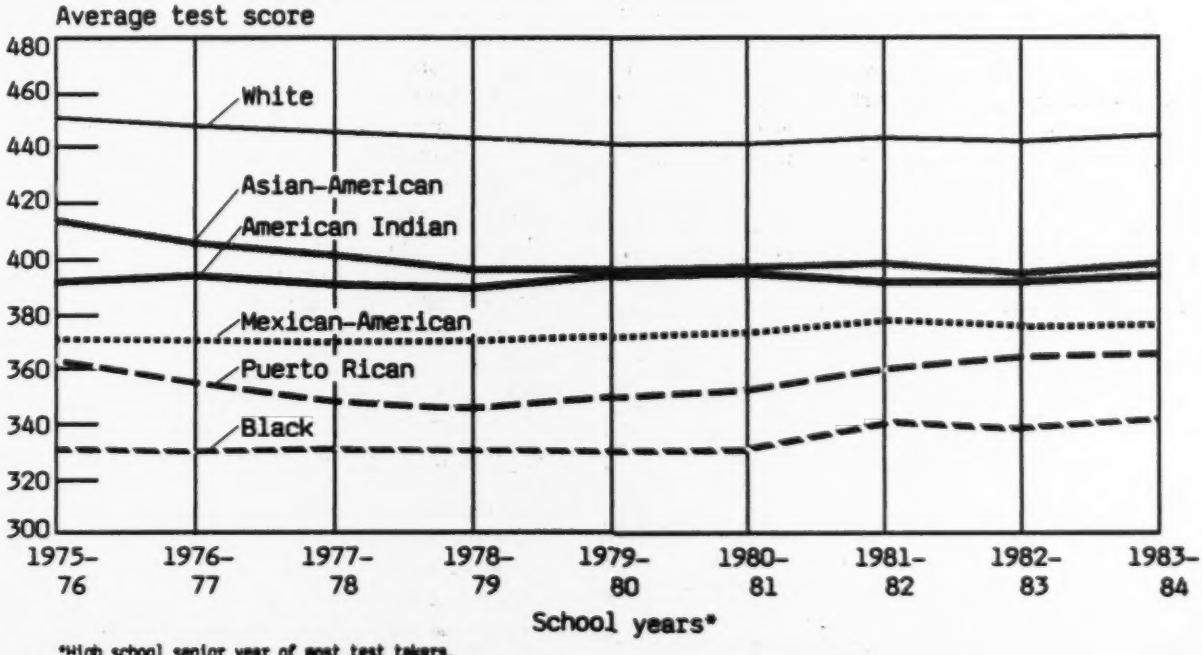
These exercises required only basic skills in reading and understanding written materials including passages, graphic materials (drawings, charts, maps, forms), and reference materials (dictionaries, encyclopedias, and telephone directories). The following sample questions illustrate the level of reading skill required for a student to be considered functionally literate:

- A picture of four doors labeled "Principal," "Nurse," "Cafeteria," and "Library" is presented and the student is asked to identify the door where one would go for lunch.
- A copy of an auto insurance policy statement is presented and the student must determine the maximum amount of coverage for medical bills under the policy.
- A listing of telephone area codes and long-distance information is presented and the student must identify the number to call to obtain a number in New York City.

[3] For an analysis using Military test scores, see Dave O'Neill, "The Effect of Discrimination on Earnings: Evidence from Military Test Score Results," *Journal of Human Resources* (Vol. V, Fall 1970).

FIGURE 3-3.

SAT Averages by Ethnic Group: 1975 – 76 to 1983 – 84 (Verbal Test Scores)

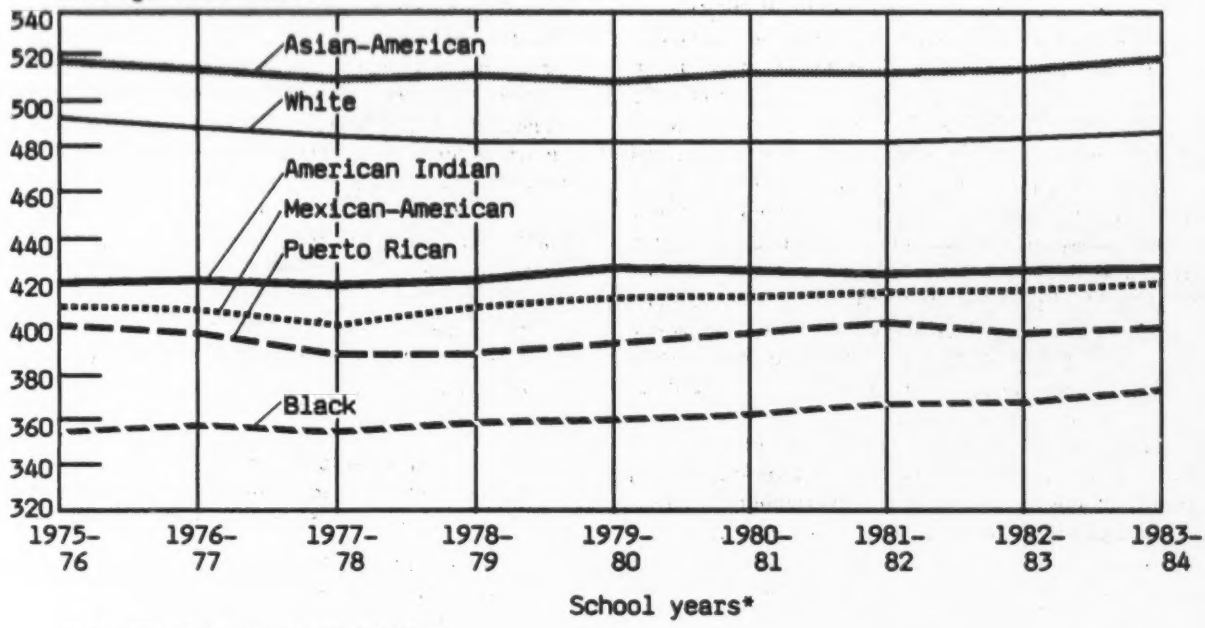


*High school senior year of most test takers.

Source: Table A-4.

FIGURE 3-4.

SAT Averages by Ethnic Group: 1975 – 76 to 1983 – 84 (Math Test Scores)



*High school senior year of most test takers.
Source: Table A-4.

Table 3-3 shows the MAFL test results by various demographic characteristics. Overall, 12.6 percent of the 17-year-old students were found to be functionally illiterate.

Unfortunately it is difficult to find more recent studies of the lowest achievers so that comparisons over time can be made. At present, the very comprehensive survey of the achievement of elementary and high school students—The National Assessment of Educational Progress—is not published in a form that can be used to study the progress of the lower tail of the test score distribution—the analogue to the poverty population in the income area.

Table 3-2. Illiteracy in the United States: 1870-1979

(Percent illiterate*)

Year	Total	White	Black
1870	20.0	11.5	79.9
1890	13.3	7.7	56.8
1910	7.7	5.0	30.5
1930	4.3	3.0	16.4
1947	2.7	1.8	11.0
1959	2.2	1.6	7.5
1969	1.0	0.7	3.6
1979	0.5	0.4	1.6

*Refers to the civilian noninstitutional population 14 years old and over.

Source: U.S. Bureau of the Census, *Statistical Abstract of the United States: 1984*, (104th ed.) Wash., D.C., 1983, p. 146, table 227; and *Historical Statistics, Colonial Times to 1970*, series 669-688.

Tables 3-4 and 3-5 show the format of published NAEP data. Table 3-4 shows data for all tests given at a single point in time for a single age group. Table 3-5 shows data on changes over time in a single test, for all three age groups reported on.

In each table, group differences in "mean percent correct" are shown—e.g., differences by race and sex—but within each of these groups there are individual students at much lower scores than the average reported for the group.

What is needed are published frequency distributions showing the whole range of scores made by all the individuals taking the test. Then some minimal test score level can be specified—say 40 percent of the overall median score. Thus if the median were 60 percent correct answers, then the level needed for minimal competency would be 24 percent correct. The fraction of youth with scores below that level could be computed each year or few years, and this statistic could then be tracked over time to monitor the progress being made on this most pressing social problem.

DECLINE IN THE QUALITY OF SCHOOLING[4]

The discussion is organized around three questions. What is the evidence that the quality of elementary and secondary schooling actually did decline? If a decline did occur, what

[4] This issue refers to the schooling received by the general body of students. The problem of students at the very bottom of the achievement scale, those who are not reaching a minimal competency, is beyond the scope of this particular report. This does not reflect a judgement as to the relative importance of the two problems.

Table 3-3. 17-Year-Olds Who Scored Below 75 Percent on the MAFL, by Race and Education of Parents: 1974

Race	Total	Education of parents	
		Advantaged	Disadvantaged*
Total	12.6	8.8	25.8
White	8.2	6.6	15.6
Black	40.9	30.0	57.0
Other	30.5	27.8	29.3

*Neither parent completed high school.

Source: National Assessment of Educational Progress Survey. See: Charles J. Gadway, *Functional Literacy: Basic Reading Performance*, (Denver, Colorado; NAEP, 1976).

were the specific school factors that caused the decline? Finally, given some knowledge about causal factors, what is being done to remedy the situation?

Evidence of the Decline

From the content of the numerous articles in newspapers and popular magazines, one would not think it necessary to demonstrate that there has been a decline. However, although the evidence does exist for this conclusion, it is not as obvious as simply pointing to the decline in SAT scores. Factors that affect SAT scores, other than the quality of schooling, have been changing since the mid-60's, and their contribution to the decline must be assessed before a decline in the quality of schooling can be inferred.

A detailed analysis of the SAT score decline was done by the College Entrance Examination Board (CEEB).[5] They exam-

[5] *On Further Examination*, (College Entrance Examination Board, New York, 1977).

Table 3-4. National Assessment of Educational Progress in Reading for Ages 9, 13, and 17, by Selected Characteristics of Participants: 1974-75 and 1979-80

Selected characteristics of participants	Age 9			Age 13			Age 17*		
	Mean % correct		Mean change	Mean % correct		Mean change	Mean % correct		Mean change
	1974-75	1979-80		1974-75	1979-80		1974-75	1979-80	
All participants	65.2	67.9	2.6	59.9	60.8	0.9	69.0	68.2	-0.8
Region:									
Northeast	66.9	69.9	3.0	60.9	61.7	0.8	70.2	68.4	-1.8
Southeast	62.0	66.5	4.5	56.8	57.9	1.1	65.5	65.3	-0.2
Central	67.5	68.8	1.3	62.5	63.4	0.9	71.4	70.3	-1.1
West	63.9	66.7	2.8	58.8	59.8	0.9	67.5	68.2	0.7
Sex:									
Male	63.1	66.0	3.0	57.6	58.8	1.2	67.2	66.9	-0.4
Female	67.4	69.7	2.3	62.2	62.6	0.4	70.6	69.7	-1.0
Race:									
Black	54.5	59.6	2.1	46.4	49.6	3.2	52.1	52.2	0.1
White	67.0	69.3	2.3	61.9	62.6	0.7	71.2	70.6	-0.6
Hispanic	55.0	60.3	5.3	49.0	51.5	2.5	56.8	58.8	2.0
Parental education:									
Not high school graduate	58.1	60.8	2.7	52.5	52.9	0.4	60.6	59.2	-1.4
Graduated high school	66.2	67.1	1.0	59.5	59.5	0.1	67.7	65.6	-2.0
Post high school	69.6	71.5	1.9	66.0	65.4	-0.6	74.3	73.1	-1.2
Size and type of community:									
Extreme rural	63.0	66.9	4.0	57.2	58.6	1.4	67.9	65.1	-2.8
Low metropolitan	55.2	58.0	2.8	48.6	53.4	4.8	59.3	59.2	—
High metropolitan	71.3	73.1	1.8	66.7	67.9	1.3	76.0	73.5	-2.5
Main big city	60.8	66.0	5.2	54.9	57.5	2.6	63.8	64.5	0.7
Urban fringe	68.4	69.6	1.2	63.6	62.8	-0.8	71.5	70.8	-0.7
Medium city	65.5	69.0	3.5	58.7	60.6	1.9	69.3	68.4	-0.9
Small place	65.3	67.6	2.3	60.1	61.1	1.0	69.3	68.4	-0.9

Note: The mean change is equal to the difference in the mean correct for each year but may differ in this table due to rounding.

*All participants of this age were in school.
—Represents zero.

Source: National Center for Educational Statistics, *Digest of Educational Statistics 1982*, table 26, p. 32.

Table 3-5. National Assessment of Educational Progress for Persons 17 Years Old, by Subject and by Selected Characteristics of Participants in the United States: 1975-80

Selected characteristics of participants	Reading/ literature comprehension	Music	Art	Citizenship	Social studies	Science	Mathematics skills
National mean p[1]	79.1	50.0	50.6	67.4	67.6	53.5	59.0
Mean delta p[1] (difference from national means):							
Region:							
Northeast	0.2	-0.2	0.9	0.8	0.9	2.2	3.3
Southeast	-2.0	-1.9	-2.0	-2.2	-2.4	-4.1	-4.6
Central	0.5	0.9	0.2	0.9	0.9	1.2	2.6
West	1.1	0.9	1.0	0.1	0.2	-0.8	-2.7
Sex:							
Male	-1.4	-1.8	-1.3	—	0.2	2.6	1.3
Female	1.4	1.7	1.2	—	-0.2	-2.5	-1.2
Race:							
Black	-16.6	-6.6	-4.6	-8.6	-9.4	-15.7	-17.6
White	2.9	1.2	0.8	1.6	1.6	2.6	2.9
Hispanic	-8.0	-6.2	-3.4	-8.2	-8.3	-10.8	-12.0
Parental education:							
Not high school graduate	-8.6	-5.6	-4.6	-6.4	-6.6	-8.0	-10.8
Graduated high school	-2.2	-2.1	-2.4	-1.5	-1.5	-1.8	-3.0
Post high school	3.4	3.4	3.1	4.6	4.6	5.1	6.3
Size and type of community:							
Low metropolitan	-10.4	-4.9	-2.3	-5.8	-6.1	-12.3	-13.4
Extreme rural	-0.7	-2.4	-5.0	-0.1	-0.3	—	-2.5
Small place	0.5	0.1	-1.0	0.2	0.2	0.5	-1.6
Medium city	0.7	0.2	0.6	-0.2	-0.2	1.7	5.5
Main big city	-3.3	-0.6	0.2	-1.2	-1.2	-5.8	-2.1
Urban fringe	1.1	0.1	1.4	0.8	0.8	2.8	3.1
High metropolitan	5.9	3.2	3.6	4.2	4.2	4.4	9.8

Note: Data are for the following years: 1975-76 citizenship, social studies; 1976-77 science; 1977-78 mathematics skills; 1978-79 music, art; 1979-80 reading/literature comprehension.

—Represents zero.

[1]The mean delta p is a single number used in national assessment to describe a group's performance. The percent correct, or the p, for an exercise (test item) can be expressed for the Nation as a whole or for national assessment groups. The difference between these percentages is the delta p for the exercise. The mean for a group is the mean of all delta p's for the group.

Source: National Center for Educational Statistics, *Digest of Education Statistics 1982*, table 20, p. 27.

ined two factors that could have accounted for the decline in SAT scores other than quality of schooling—changes in the average ability level of students taking the test and the content of the test itself.

On changes in the difficulty of the SAT itself, the CEEB report concludes that this factor cannot account for any of the decline. Whenever questions are changed (to keep up with changes in course content in the high schools), certain "key questions" are retained on the revised tests. These allow CEEB statisticians to estimate the effect of unintended changes in the difficulty of the test questions.

Between 1960 and 1970, the percent of all 18-year-olds who were enrolled in college for the first time went from 34.2 to 47.0 percent. Since it is likely that the average ability level will fall as the fraction of an age cohort taking the SAT increases, the CEEB study assembled data on various measures of the high school class standing of SAT takers in 1960 and 1970. High school grades were used as were relative standing (i.e., relative to entire high school class) on standardized tests. The CEEB study conclued, that for the 1963-70 period, the ability factor could account for about two-thirds of the observed decline in SAT scores. However, for the post 1970 period, their conclusion is that most of the decline took place within ability categories, as measured by the students percentile ranking on tests given in high school. Thus the SAT scores of students who were in the same percentile on high school achievement tests, were declining significantly in the post 1970 period, while in the 1963-70 period, the decline primarily reflected more students from lower percentiles taking the SAT. Barbara Lerner, an independent scholar of education, cites other bodies of test score data on secondary school students that also

support the conclusion that the quality of schooling declined.[6] These other tests include the American College Testing program (ACT), which is taken by about a half million high school students each year, cognitive tests taken by students in different waves (1960 and 1972) of the massive Project Talent Study, the science, writing, citizenship, and social studies tests given to 17-year-old students by the National Assessment of Educational Progress, and results of the Iowa Tests of Educational Development. Ms. Lerner also cites declines in achievement test scores at grade levels 5 through 8 over the same period.[7]

In sum, it would appear that between the late 60's and the present, a substantial decline in the achievement levels of high school students took place, that cannot be explained by changes in the average natural ability level of students taking the test, or by changes in the content of the test itself. Something about the behavior of the schools (or the way the schools controlled the behavior of the student) contributed to change.

Causal Factors

The evidence on the specific school factors that caused the decline comes from a number of sources. Researchers have remarked on changes in a number of school and school/student factors that have changed since the mid-60's and could have been responsible for the observed decline in achievement. The most often mentioned are: amount of homework assigned, amount of class time spent directly on relevant school work, length of school day and school year, and textbook "demand levels." The first three are sometimes referred to as the "hard work" factors. The last refers to the degree to which textbooks present the material to be learned in a straight forward business-like way, not using entertainment-oriented techniques to attract the child's interest. The greater the "demand level" the less entertainment oriented is the textbook.

Changes in all these factors have been documented over the period in question.[8] Using statistical techniques like multiple regression analysis, researchers have shown that, holding other things constant, more homework, less absenteeism, more challenging courses and higher-demand-level textbooks, raise student achievement.[9]

In addition to these four school-related factors, researchers have also mentioned broader societal factors that may have had independent negative effects of their own—the increase in the average family size of students may have reduced parental "input" received by students taking the SAT over the period; the increase in single-parent families and two-earner families may have had similar effects; increased time spent watching TV can reduce student motivation, and so on.[10] Some of these sociodemographic trends may reverse themselves, and this will contribute to a reversal in the test score decline.[11]

What is Being Done

From numerous articles in newspapers and magazines, as well as TV reports, the impression is that many public school systems are reacting to the challenge of declining achievement by making various changes. A recent government report documents many responses.[12]

Certain of the reforms have emerged as controversial—e.g., teacher competency testing and "merit pay"—both aimed at improving teacher performance. Testing students for minimum competency as a requisite for promotion, although mainly a response to the problem of students below minimum competency (rather than the general decline in achievement), has also been a significant development.

The National Commission on Excellence in Education suggested four areas of reform, which they urged all school systems to adopt: (1) curriculum reform, requiring that all students, not just those who are college bound, be required to take 4 years of English, 3 years of math, 3 years of science, 3 years of social studies, and 1 year of computer science; (2) high schools should raise and quantify their standards (e.g., make it harder to get an A) and colleges should raise their minimum entry requirements; (3) more homework should be assigned, a longer school day should be adopted, and more school days per year should be scheduled; and (4) preparation and rewarding should be improved.

[6] Barbara Lerner, *Op. Cit.*

[7] Paul Copperman, "The Achievement Decline in the '70's," *Phi Delta Kappan 60*, (1979), pp. 736-739.

[8] *A Nation At Risk, Op. Cit.*, Barbara Lerner, *Op. Cit.*, *On Further Examination, Op. Cit.*

[9] James Coleman, "Public Schools, Private Schools and the Public Interest," *Public Interest*, Summer 1981.; Richard M. Wolf, *Op. Cit.*

[10] *A Nation At Risk, Ibid;* Barbara Lerner, *Ibid.*; *On Further Examination, Ibid.*

[11] Easterlin, who has analyzed the "baby-boom, baby-bust" sequence between 1948 and 1975, "What Will 1984 Be Like? Socioeconomic Implications of Recent Twists in Age Structure" *Demography*, Vol. 15, #4, Nov. 1978, pp. 397-432, forecasts a return to larger family size as the baby-bust children become parents.

[12] U.S. Department of Education, *The Nation Responds*, (U.S. Government Printing Office, May 1984).

Chapter 4.
Enrollment, Costs, and Resource Use

In recent years, clashes between local teacher's unions and local government units over salary increases have become almost as regular as the seasons themselves. In addition to a wave of taxpayer protest against government spending in general, the situation for teachers and school system officials has been greatly exacerbated by the baby-boom-generation cohorts passing into older age ranges. The resulting sharp decline in enrollments have placed school administrators under pressure to reduce resources or be faced with sharp increases in costs per student. On the college side, there appears to be as much concern over increased tuition costs but the protests are less concentrated.

This chapter reviews the trends in the major elements of the costs per student for both the elementary and secondary schools and for colleges, with more attention paid to the lower schools. For these schools, an attempt is made to identify the components that underlie the very large increase in cost per student that has taken place in recent years. The first section below presents a brief discussion of a framework for analyzing the determinants of cost. Then the trends in resource use and costs are presented. A final section looks at the long-term outlook for enrollments.

EDUCATION AS AN INDUSTRY

Although not usually thought of as an industry, viewing education this way provides a useful framework for understanding the determinants of cost and to know which trends to focus on in the empirical analysis. An analysis of an industry stresses three types of factors determining the cost of the industry's output: the incentives of the resource managers, the types and productivity of the resources used (including the time of students in colleges), and the costs of the various resources used. These three factors together are important determinants of how efficiently education is produced.

Efficiency, as used here, means the production of the type of education desired at the least possible cost. Thus, efficiency is not only a question of cost per quantitative unit, but also involves the type and quality of education being produced. The evidence just reviewed in chapter 3 indicated a decline in recent years in the efficiency of schools in the quality of education produced. In this chapter, we are focusing on the more quantitative aspects of efficiency—resources used per student.

In the United States, the major source of differences in incentives facing the school administrators who manage resources is between private and public schools. Therefore our survey will highlight the trends in schools and enrollment by type of control. Similarly, the major resource used by schools are teachers, so our survey will focus on trends in the costs of this resource and in its productivity or utilization.

TRENDS: ELEMENTARY AND SECONDARY

Table 4-1 shows trends in elementary and secondary school enrollment, by type of control, from 1940 through 1983. The growth and decline in enrollment in elementary schools mainly reflected changes in population growth, but that of secondary schools was due to both population growth and increased participation by youths 14 to 17 years old. In school year 1939-40, total enrollment in grades 9-12 was 73.3 percent of youths 14 to 17 years old, but by fall of 1980 the figure had risen to 93.7 percent.

Private schools rose in relative importance until the 1960's, during which they fell somewhat, and appear to have stabilized at a somewhat lower level than at the beginning of the 60's. The decline in the 60's was almost totally a decline in private Catholic schools. From the fall of 1964 to the fall of 1980, Catholic elementary and secondary school enrollment declined from 5.6 million to 3.1 million. Thus non-Catholic private schools, although quite small relative to public schools, have been growing throughout the period. Still, in 1981 non-Catholic private elementary and secondary students came to only 3.3 percent of total public and private enrollment.[1]

It is notable in this connection that until 1960 private schools in the U.S. were almost synonymous with Catholic parochial schools. If we go back to the turn of the century, we find these Catholic schools providing 15 percent of all senior high school enrollment, while at present all private schools (Catholic and other) are supplying only 7.6 percent of grade 9-12 enrollment.

Figure 4-1 and table 4-2 show trends in the enrollment, number of classroom teachers and the student/teacher ratio

[1] This includes kindergarten but excludes nursery schools. Private schools have provided about 70 percent of all nursery school enrollment. Nursery enrollment was 28 percent of kindergarten enrollment in 1969 and 65 percent in 1982.

Table 4-1. Enrollment in Educational Institutions by Level of Instruction and Type of Control, for Selected School Years: 1939-83

(Figures in thousands)

Beginning of school year	Elementary school grades 1-8 and kindergarten			High school grades 9-12		
	Public	Private	Percent private	Public	Private	Percent private
1939	18,832	2,153	10.3	6,801	457	6.5
1949	19,387	2,708	12.3	5,725	672	10.5
1959	27,602	4,640	14.4	8,485	1,035	10.9
1969	32,597	4,200	11.4	13,022	1,300	9.1
1970	32,577	†4,100	11.2	13,332	†1,300	8.9
1971	32,265	3,800	10.5	13,816	1,300	8.6
1972	31,836	3,700	10.4	13,906	1,300	8.5
1973	31,353	3,600	10.3	14,076	1,300	8.5
1974	30,921	3,600	10.4	14,132	1,400	9.0
1975	30,487	3,600	10.6	14,304	1,400	8.9
1976	30,006	3,600	10.7	14,310	1,400	8.9
1977	29,336	3,600	10.9	14,240	1,400	8.9
1978	28,455	3,600	11.2	15,156	1,400	9.0
1979*	27,884	3,700	11.7	13,694	1,400	9.3
	(27,349)	(3,541)	(11.5)	(13,994)	(1,122)	(7.4)
1981	27,374	3,582	11.6	13,523	1,119	7.6
1982	27,128	3,585	11.6	13,004	1,118	7.9
1983	26,909	3,650	11.9	12,792	1,218	8.7

*For 1979, the figures in parentheses are from the Current Population Survey.
†For 1970 through 1979, the figures for private school enrollment (from NCES) are estimated.

Source: 1939-79 are from the *Digest of Educational Statistics 1982*, tables 3 and 28. 1979-83 are from U.S. Bureau of the Census, Current Population Reports, series P-20, *Social and Economic Characteristics of Students*, October of each year.

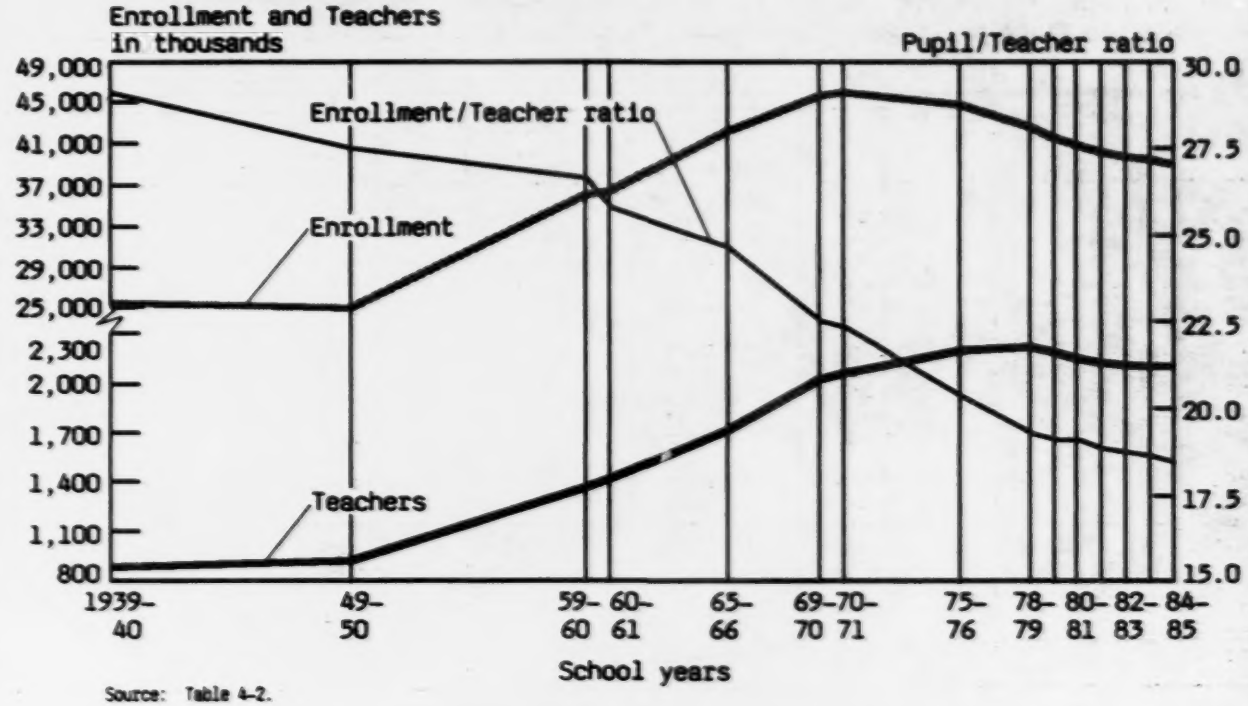
for elementary and secondary schools combined. Between 1940 and 1982, there was a substantial drift downward in the pupil/teacher ratio in public schools. While schools were utilizing each teacher less intensively (e.g., smaller class size), teacher's salaries were undergoing gradual swings up and down relative to earnings rates in the rest of the economy. Figure 4-2 and tables 4-3 and 4-4 contain two series relating to teachers salaries. One is the average annual salary of classroom teachers and the other is the average annual salary of all "instructional staff," which includes principals, librarians, and other professional personnel in addition to classroom teachers. Each series is presented both in constant dollars and as a ratio to a measure of the general level of pay rates received throughout the economy. It is important to keep in mind that both pay series do not include the value of fringe benefits that are paid for by the employer. These may differ between the education industry and the rest of the economy, and the difference may have changed over time.

With this caveat, we can say that public school teachers' pay has shown remarkable relative stability over the very long term, while also undergoing some substantial swings up and down within the overall period. The longer series shows that teachers' relative pay rose during the Great Depression, fell during World War II, rose continuously from 1946 to 1972, and has drifted down since then. Over the entire 50 year period, teachers' relative pay actually rose about 9 percent. However since the post-war peak ratio in 1970, teachers have lost ground relative to workers generally. After making relative gains throughout the 60's as the baby-boom generation increased the demand for teachers, teachers appear to be slipping behind in the race to keep up with the inflation of the 1970-80 period. This period also contained the beginning of the enrollment decline associated with the final passing of the baby-boom generation through elementary and high schools.

The trend to smaller class size implies a rise in the cost per unit of educational output, unless it is offset by sufficient declines in the relative cost of teachers or other inputs. Data in figure 4-3 and table 4-5 show that real resources per pupil in average daily attendance (col. 2) has indeed risen sharply over the 1955-83 period. Col. 3 compares the growth in resources per pupil to the growth in the average income of males who worked year round (50-52 weeks) at full-time jobs. Since the composition of families by type (e.g., two earner families; one parent, female headed families) has changed significantly over the period, the growth in average earnings of adult persons is probably a better gauge of

FIGURE 4-1.

Enrollment, Classroom Teachers, and Enrollment per Teacher for Public Elementary and Secondary Schools: 1939–40 to 1984–85



Source: Table 4-2.

Table 4-2. Student to Teachers Ratios for Public Elementary and Secondary Schooling Combined, for Selected Years: 1939-84

(Figures in thousands)

Beginning of school year	Enrollment	Teachers	Ratio E/T
1939	25,433	875	29.1
1949	25,112	913	27.5
1959	36,087	1,355	26.6
1960	36,281	1,408	25.8
1965	42,173	1,710	24.7
1969	45,619	2,023	22.5
1970	45,909	2,055	22.3
1975	44,791	2,196	20.4
1978	42,550	2,207	19.3
1979	41,579	2,183	19.1
1980	40,987	2,145	19.1
1981	40,148	2,125	18.9
1982	39,643	*2,110	18.8
1983	39,475	*2,108	18.7
1984	*38,925	*2,100	18.5

*Estimate, preliminary.

Source: *Digest of Education Statistics, 1982*, National Center for Education Statistics, tables 3 and 6; U.S. Bureau of the Census, *Statistical Abstract of the United States: 1984*, (104th ed.) Wash., D.C., 1983, table 233, p. 150. Mr. Vance Grant of the National Center for Educational Statistics provided unpublished data for 1982, 1983, and 1984.

growth in the living standards of the average family than average family income is.[2]

The comparison shows that the growth in resources per pupil outstripped the growth in our indicator of the real income of the average family. School resources per pupil day rose from 6.8 percent to 13.3 percent of the income of full-year, full-time workers.

Until the early 70's, this growth was accompanied by growing enrollment and real family income. Between 1960 and 1970, real income of full-time, full-year workers, grew by 29 percent and enrollment grew by 27 percent. Both these factors created demands for moving resources into education from other sectors of the economy, and growth in the level of family income might have also increased the demand by parents for more resources to be used per student. Within this context, the sharp rise in real expenditures per student can be viewed as a necessary concomitant of the bulge in enrollment caused by the baby-boom generation. Teachers salaries rose relative to other occupations in order to attract the needed extra supply, and more resources were used per pupil perhaps in response to the demands of parents whose real income was rising rapidly.

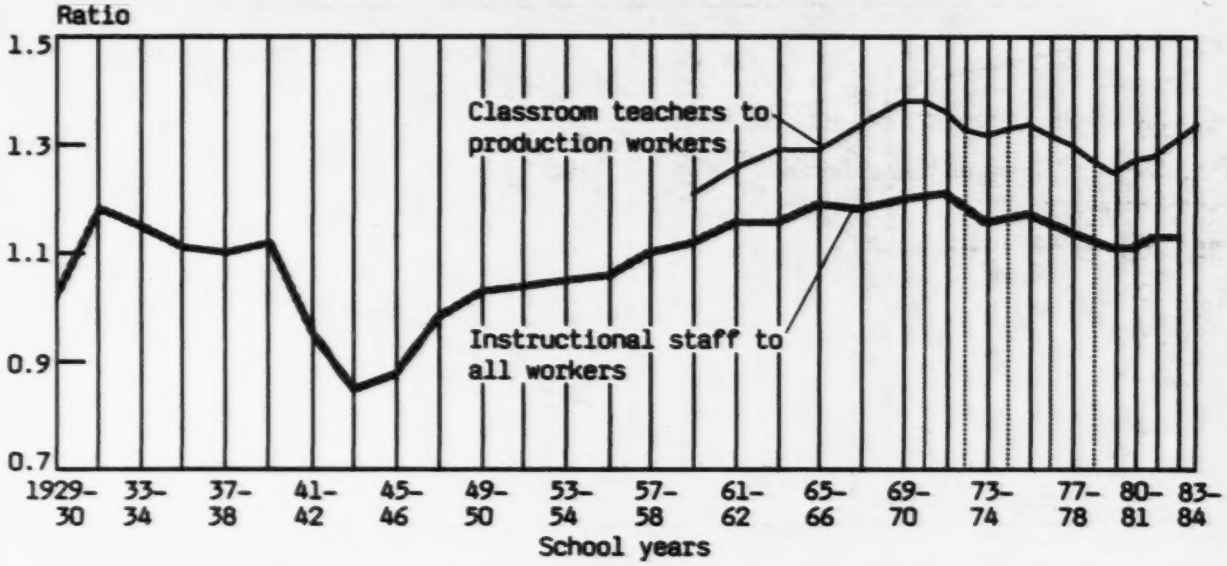
However, since the early 70's enrollment has been falling and real family income growth has practically ceased, with

[2]Average earnings are mainly influenced by productivity growth which is the underlying source of society's ability to pay for education.

FIGURE 4-2.

Relative Salaries of Teachers: 1929–30 to 1983–84

Ratio of Annual Salary of Classroom Teachers to Annualized Hourly Earnings of Production Workers*, and Ratio of Salary of Instructional Staff to Wage and Salary Earnings per Full–Time Equivalent Worker**



*Covers production or nonsupervisory workers in all nonagricultural industries.
**Part-time workers are converted to fulltime on the basis of hours worked. Covers all workers in the economy.

Source: Tables 4-3 and 4-4.

income in the 70's never rising more than 6 percent above its 1970 level and by 1980 it was below its 1970 level as the economy slipped into the recent recession. In this context, the continuing rise in real expenditures per pupil must be interpreted quite differently. Some observers have pointed to the steady decline in enrollment throughout the 70's as a possible cause of the rise in resource costs per pupil. Schools may have difficulty in cutting back rapidly on staff size. Moreover, the loci of revenues for public schools has changed dramatically since the end of World War II. Table 4-6 shows that since 1945 the relative importance of Federal and State sources of revenues have increased sharply, and this may have influenced the degree to which local school administrators respond to economic vicissitudes like declining enrollments. A soon to be released study[3] which followed individual school districts in Michigan through time during the period of falling enrollments, concluded that 2 years following a decline in enrollment school districts began to cut back on the number of teachers. After 2 more years, the original increase in cost per student (which approximated the percentage decline in enrollment) was reduced by about 50 percent. This suggests that costs per student could decline in the years ahead.

[3] Edward S. Cavin, Richard Murnane and Randell S. Brown, "How Enrollment Declines Affect Per-Pupil Expenditure Levels in Public School Districts," Mathematica Policy Research, April 1984.

Clearly much more research is needed on the factors determining efficiency of resource use in the supply of elementary and secondary education. The data in table 4-7 suggest that there is much to know about cost patterns and resource use in public school systems. In school year 1979-80, expenditures per pupil in average daily attendance varied by 100 percent from the lowest State (Alabama, $1,741) to the highest State in the continental U.S. (New York, $3,681). This was accompanied by wide variations in the relative importance of sources of revenue, teacher's salaries, and pupil/teacher ratios. Cost comparisons between public and private schools would also be useful. The work being done comparing achievement scores cited in chapter 3 would be greatly enhanced with knowledge about costs and resource allocation as well.

TRENDS: POST-SECONDARY EDUCATION

Unlike elementary and secondary schools, post-secondary institutions are composed of a number of very different subgroups. At one extreme is the modest noncollege proprietary vocational-technical or business institute, located on a downtown street in an urban area. At the other extreme is the sprawling, multifunction university, which encompasses research institutes and medical centers, as well as providing undergraduate and graduate education to students. In between

Table 4-3. Average Annual Salary of Classroom Teachers in Public Schools and Its Ratio to the Average Hourly Earnings of Production or Nonsupervisory Workers in Private Nonagricultural Industries: 1959-60 to 1983-84

School year	Classroom teacher's salary		Ratio of classroom teacher's salary to 2000 average hourly earnings in private nonagricultural industries
	Current dollars	1980-81 dollars	
1959-60	4,995	14,723	1.21
1961-62	5,515	15,885	1.26
1963-64	5,995	16,825	1.29
1965-66	6,485	17,589	1.29
1967-68	7,423	18,897	1.34
1969-70	8,635	19,801	1.38
1970-71	9,269	20,212	1.38
1971-72	9,705	20,426	1.36
1972-73	10,176	20,587	1.33
1973-74	10,778	20,014	1.32
1974-75	11,690	19,547	1.33
1975-76	12,591	19,658	1.34
1976-77	13,355	19,709	1.32
1977-78	14,213	19,654	1.30
1978-79	15,043	19,017	1.27
1979-80	15,996	17,812	1.25
1980-81	17,602	17,602	1.27
1981-82	19,142	17,401	1.28
1982-83	20,531	18,169	1.31
1983-84	21,935	18,664	1.34

Source: (1959-60 through 1981-82) *Digest of Education Statistics, 1982 and 1983.* Figures for 1982-83 and 1983-84 are preliminary data provided by National Center for Educational Statistics. Average hourly earnings data are from *The Economic Report of the President, 1985.* Annual data were averaged to correspond to the school year.

Table 4-4. Average Annual Salary of Instructional Staff in Public Schools and Its Ratio to Total Wage and Salary Earnings per Full-Time Equivalent Employee in the Economy: 1929-30 to 1982-83

School year	Salary of instructional staff		Ratio to wage and salary earnings per full-time equivalent workers in the economy*
	Current dollars	1981-82 dollars	
1929-30	1,420	7,808	1.02
1931-32	1,417	9,252	1.18
1933-34	1,227	8,719	1.15
1935-36	1,283	8,792	1.11
1937-38	1,374	9,037	1.10
1939-40	1,441	9,704	1.12
1941-42	1,507	9,105	0.95
1943-44	1,728	9,342	0.85
1945-46	1,995	10,300	0.88
1947-48	2,639	10,656	0.98
1949-50	3,010	11,963	1.03
1951-52	3,450	12,351	1.04
1953-54	3,825	13,381	1.05
1955-56	4,156	14,550	1.06
1957-58	4,702	15,483	1.10
1959-60	5,174	16,574	1.12
1961-62	5,700	17,842	1.16
1963-64	6,240	19,031	1.16
1965-66	6,935	20,440	1.19
1967-68	7,630	21,109	1.18
1969-70	8,840	22,028	1.20
1971-72	10,100	23,101	1.21
1973-74	11,185	22,571	1.16
1975-76	13,120	22,261	1.17
1977-78	14,697	22,087	1.14
1979-80	16,773	20,336	1.11
1980-81	18,409	20,251	1.11
1981-82	20,114	20,114	1.13
1982-83	21,520	20,954	1.13

*Calendar year data on wages and salary earnings were averaged to match the school year.

Source: *Digest of Education Statistics, 1982,* table 50, p. 57. Data for 1981-82 and 1982-83 are preliminary, provided by the National Center for Educational Statistics. Wage and salary data are from U.S. Department of Commerce, *Survey of Current Business,* July issue, selected years.

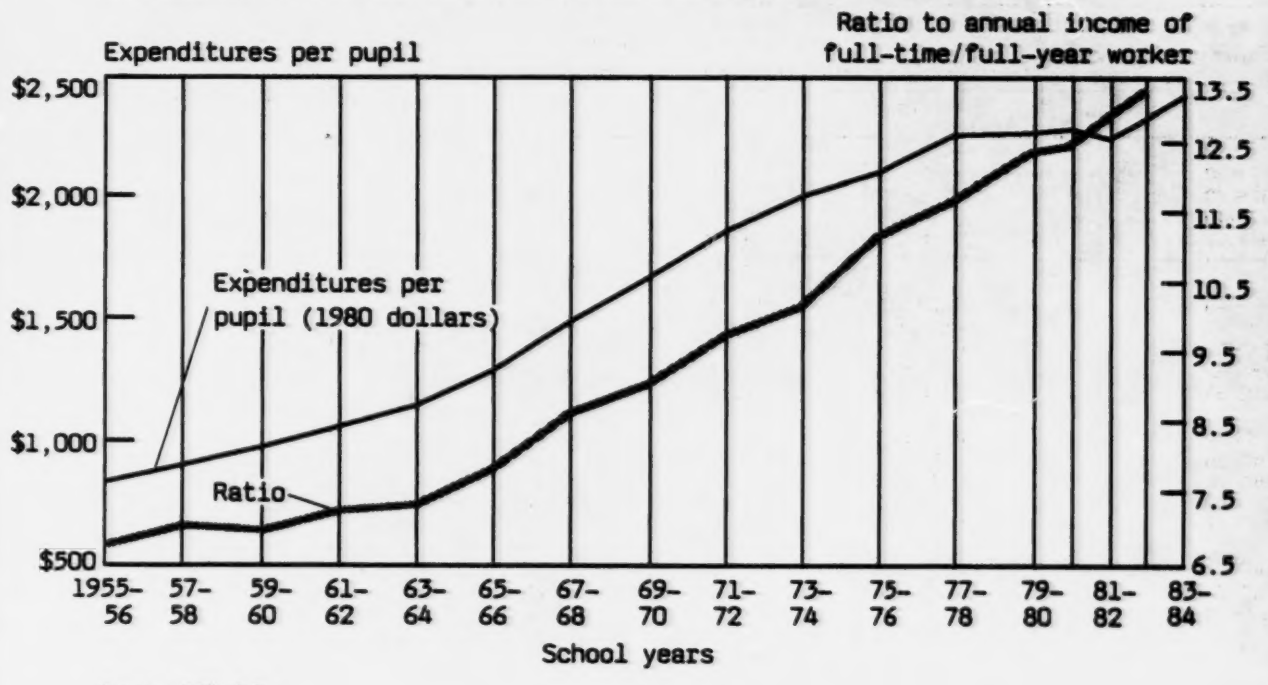
these extremes, are the 2-year community college and the traditional 4-year college. Students can attend either fulltime or parttime, day or night, and for degree credit or not. The range of subjects and courses provided is very large. After briefly describing past enrollment trends, we depict the relevant trends in resource costs.

Figure 4-4 shows enrollment in institutions of higher education (IHE)[4] by attendance status, sex, and type of control. Sex is important to consider for post-secondary education because enrollment rates for women have only recently reached the level of men. Figure 4-4 shows some of the dramatic changes that have taken place in higher education since the end of World War II. Public institutions provided for less than 50 percent of total enrollment in 1948, but by 1980 they provided for 75 percent. Female enrollment went from 29 percent of total enrollment in 1948 to 51 percent in 1980. Part-time students went from 30 percent of total enrollment in 1966 to 41 percent in 1980. Another change not shown in figure 4-4, is the growth in 2-year institutions. They went from having 17 percent of total enrollment in 1963 to 37 percent in 1980. Finally, enrollment in noncollegiate post-secondary institutions have become a significant percentage of total post-secondary enrollment. Data are available since 1973, and from this time until 1980 the noncollegiate post-secondary enrollment has been about 15.3 percent of IHE degree credit enrollment—1.6 million in

[4] IHE's are colleges (2 or 4 years) and universities. It excludes "noncollegiate" post-secondary schools.

FIGURE 4-3.

Current Account Expenditure per Pupil and Its Ratio to the Median Income of Male Full-Time, Full-Year Workers: 1955-56 to 1983-84



Source: Table 4-5.

Table 4-5. Expenditures per Pupil in Average Daily Attendance and Its Ratio to the Median Annual Income of Male Full-Time, Full-Year Workers, for Total Expenditures and Only Current* Account Expenditures: 1955-56 to 1983-84

School year	Expenditures per pupil				Ratio to annual income of full-time workers	
	Total expenditures		Current account only			
	Current dollars	1980 dollars	Current dollars	1980 dollars	Total exp.	Current acct. exp.
1955-56	388	1,120	294	849	9.1	6.8
1957-58	499	1,219	341	926	9.5	7.1
1959-60	472	1,247	375	991	9.0	7.0
1961-62	530	1,368	419	1,081	9.3	7.3
1963-64	559	1,406	460	1,157	9.2	7.4
1965-66	654	1,590	537	1,305	9.9	7.9
1967-68	786	1,794	658	1,502	10.8	8.7
1969-70	955	1,936	816	1,677	11.0	9.1
1971-72	1,128	2,128	990	1,868	11.7	9.8
1973-74	1,364	2,270	1,207	2,009	11.9	10.2
1975-76	1,697	2,375	1,504	2,105	13.3	11.2
1977-78	2,002	2,481	1,823	2,259	13.3	11.7
1979-80	2,494	2,494	2,272	2,272	14.2	12.4
1980-81	(NA)	(NA)	2,487	2,281	(NA)	12.5
1981-82	(NA)	(NA)	2,726	2,248	(NA)	12.9
1982-83	(NA)	(NA)	2,948	2,331	(NA)	13.3
1983-84	(NA)	(NA)	3,182	2,427	(NA)	(NA)

*All expenditures for day schools except capital outlays and interest on school debt.

Source: *Digest of Education Statistics: 1982*, table 72. Data for 1980-81 through 1983-84 were provided by Mr. W. Vance Grant of the National Center for Education Statistics. Income data are from U.S. Bureau of the Census, Current Population Reports, Series P-60, #137, *Money Income of Households, Families, and Persons in the U.S.* #146 (advance data) for 1983, U.S. Government Printing Office, Washington, D.C., 1983 and 1984.

Table 4-6. Revenue Receipts of Public Elementary and Secondary Schools From Federal, State, and Local Sources: 1919-20 to 1980-81

School year	Amount in thousands of dollars				Percentage distribution			
	Total	Federal	State	Local*	Total	Federal	State	Local
1919-20	970,120	2,475	160,085	807,561	100.0	0.3	16.5	83.2
1929-30	2,088,557	7,334	353,670	1,727,553	100.0	0.4	16.9	82.7
1939-40	2,260,527	39,810	684,354	1,536,363	100.0	1.8	30.3	68.0
1941-42	2,416,580	34,305	759,993	1,622,281	100.0	1.4	31.4	67.1
1943-44	2,604,322	35,886	859,183	1,709,253	100.0	1.4	33.0	65.6
1945-46	3,059,845	41,378	1,062,057	1,956,409	100.0	1.4	34.7	63.9
1947-48	4,311,534	120,270	1,676,362	2,514,902	100.0	2.8	38.9	58.3
1949-50	5,437,044	155,848	2,165,689	3,115,507	100.0	2.9	39.8	57.3
1951-52	6,423,816	227,711	2,478,596	3,717,507	100.0	3.5	38.6	57.8
1953-54	7,866,852	355,237	2,944,103	4,567,512	100.0	4.5	37.4	58.1
1955-56	9,686,677	441,442	3,828,886	5,416,350	100.0	4.6	39.5	55.9
1957-58	12,181,513	486,484	4,800,368	6,894,661	100.0	4.0	39.4	56.6
1959-60	14,746,618	651,639	5,768,047	8,326,932	100.0	4.4	39.1	56.5
1961-62	17,527,707	760,975	6,789,190	9,977,542	100.0	4.3	38.7	56.9
1963-64	20,544,182	896,956	8,078,014	11,569,213	100.0	4.4	39.3	56.3
1965-66	25,356,858	1,996,954	9,920,219	13,439,686	100.0	7.9	39.1	53.0
1967-68	31,903,064	2,806,469	12,275,536	16,821,063	100.0	8.8	38.5	52.7
1969-70	40,266,923	3,219,557	16,062,776	20,984,589	100.0	8.0	39.9	52.1
1971-72	50,003,645	4,467,969	19,133,256	26,402,420	100.0	8.9	38.3	52.8
1973-74	58,230,892	4,930,351	24,113,409	29,187,132	100.0	8.5	41.4	50.1
1975-76	71,206,073	6,318,345	31,776,101	33,111,627	100.0	8.9	44.6	46.5
1977-78	81,443,160	7,694,194	35,013,266	38,735,700	100.0	9.4	43.0	47.6
1979-80	96,880,944	9,503,537	45,348,814	42,028,593	100.0	9.8	46.8	43.3
1980-81	105,904,908	9,888,007	50,207,192	45,809,709	100.0	9.3	47.4	43.3

Note: Beginning in 1959-60, includes Alaska and Hawaii. Because of rounding, details may not add to totals.

*Includes a relatively small amount from nongovernmental sources (gifts and tuition and transportation from patrons). These sources accounted for 0.4 percent of the total revenue receipts in 1967-68.

Source: National Center for Educational Statistics, *Digest of Education Statistics, 1983-84*, table 62, p. 77.

1980. These schools are mostly proprietary (about two-thirds) and offer courses only in specific skill areas—e.g., in technical and health fields, and in business and marketing skills. The amount of classroom time required for program completion varies significantly by type of program—e.g., from 18 months for an aeronautical technician to 6 months for a medical assistant.

Figure 4-5 shows that the university part of higher education has been moving slowly but steadily in the direction of relatively more graduate education. Bachelor's degrees were 86 percent of all degrees conferred in 1945-46, but had fallen to 69 percent by 1979-80.

Table 4-8 shows what has been happening to the fields of study in the rapidly growing 2-year college. This table covers only those individuals who went for at least 2 years. Many individuals receive "other awards" for occupational curriculums of at least 1 year but less that 2 years in duration. In 1979-80, these awards amounted to 25 percent of the associate degree awards in occupational curriculums. Note the sharp shift toward occupational curriculums during the 70's. However it is important to note that many students in these 2-year colleges go on to 4-year colleges and universities, some without getting a degree or award.

Chapter 2 showed trends in the major fields of study of bachelor degree recipients by sex (table 2-4, chapter 2). The shifts that took place between 1972 and 1980 indicate that market forces probably have a significant impact on choice of field in college. Education degrees have plummeted (for men as well as women) along with the decline in the school age population associated with the passing of the baby boom. Business training has flourished while arts degrees have waned, and the growth in subprofessional medical degrees is likely associated with the huge growth in the demand for more and better health care.

Costs are important in evaluating the overall performance of post-secondary education just as they were for elementary and secondary education. However the estimation procedure is much more complex for colleges and universities. Teachers are expected to conduct research as well as teach. Students are sometimes taught by teaching assistants. More-

Table 4-7. Expenditures per Pupil in Average Daily Attendance in Public Elementary and Secondary Schools, by State: 1979-80

(Figures in dollars)

Geographic area	Expenditure per pupil			
	Total*	Current**	Capital outlay	Interest on school debt
United States	2,494	2,275	170	49
Alabama	1,741	1,612	115	14
Alaska	5,146	4,728	151	267
Arizona	2,433	1,971	398	64
Arkansas	1,839	1,574	224	41
California	2,376	2,268	89	19
Colorado	2,826	2,421	330	75
Connecticut	2,520	2,425	47	48
Delaware	3,019	2,868	55	96
Dist. of Columbia	3,265	3,259	6	-
Florida	2,082	1,889	160	33
Georgia	1,833	1,625	181	26
Hawaii	2,528	2,322	204	2
Idaho	1,914	1,659	215	40
Illinois	2,778	2,587	140	51
Indiana	2,166	1,910	248	7
Iowa	2,552	2,340	177	35
Kansas	2,422	2,205	175	42
Kentucky	1,847	1,701	91	55
Louisiana	2,017	1,794	172	52
Maine	1,947	1,824	82	41
Maryland	2,843	2,598	204	41
Massachusetts	2,952	2,819	54	79
Michigan	2,873	2,640	151	82
Minnesota	2,686	2,457	221	9
Mississippi	1,788	1,664	124	1
Missouri	2,071	1,936	98	37
Montana	2,882	2,476	363	43
Nebraska	2,403	2,150	199	54
Nevada	2,553	2,088	356	108
New Hampshire	2,069	1,917	115	37
New Jersey	3,379	3,191	116	72
New Mexico	2,396	2,034	339	23
New York	3,681	3,462	134	85
North Carolina	1,871	1,754	104	13
North Dakota	2,071	1,927	121	23
Ohio	2,208	2,075	94	39
Oklahoma	2,176	1,926	229	21
Oregon	3,104	2,692	355	58
Pennsylvania	2,742	2,535	101	106
Rhode Island	2,670	2,601	17	52
South Carolina	1,996	1,752	209	35
South Dakota	1,932	1,911	1	19
Tennessee	1,825	1,635	175	14
Texas	2,309	1,916	316	77
Utah	2,208	1,657	491	60
Vermont	2,240	2,049	137	55
Virginia	2,211	1,970	191	51
Washington	3,073	2,568	446	58
West Virginia	2,160	1,920	219	21
Wisconsin	2,693	2,495	145	53
Wyoming	3,326	2,527	698	101

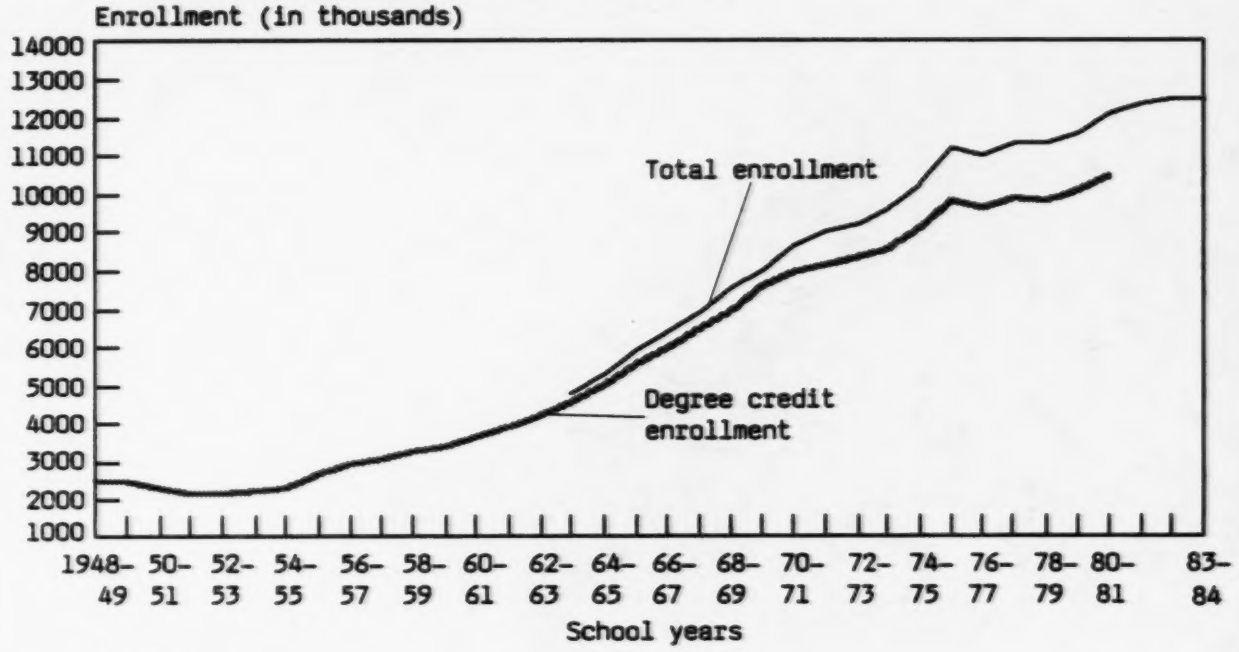
Note: Because of rounding, details may not add to totals.

*Includes current expenditures for day schools, capital outlay, and interest on school debt.
**Includes expenditures for day schools only; excludes adult education, community colleges, and community services.

Source: National Center for Educational Statistics, *Digest of Education Statistics: 1982*, table 71, p 81.

FIGURE 4-4a.

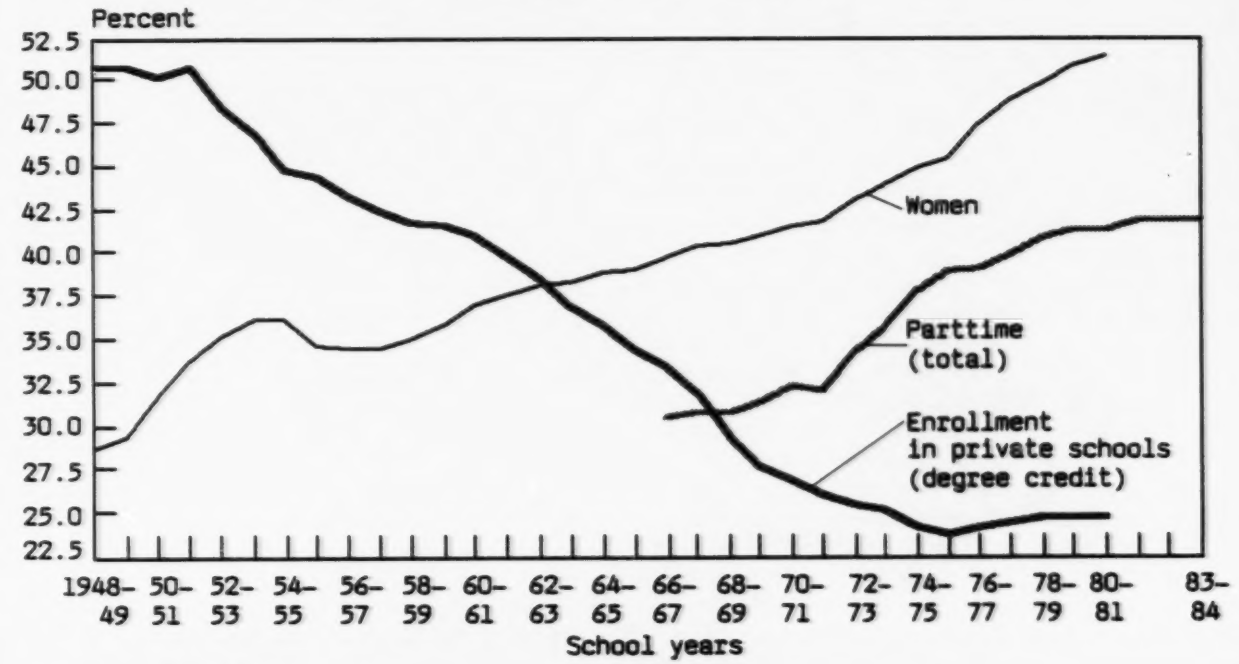
Enrollment in Institutions of Higher Education: 1948–49 to 1983–84



Source: Table A-6.

FIGURE 4-4b.

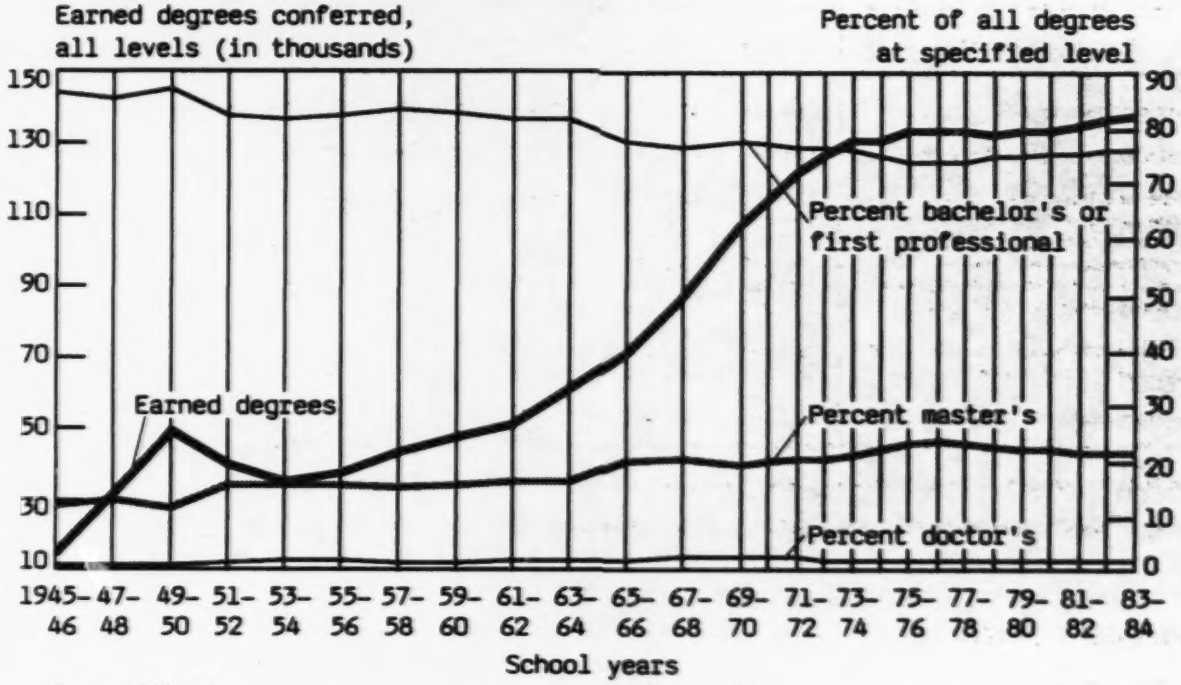
Trends in Some Characteristics of Enrollees in Institutions of Higher Education: 1948–49 to 1983–84



Source: Table A-6.

FIGURE 4-5.

Earned Degrees Conferred by Institutions of Higher Education: 1945–46 to 1983–84



Source: Table A-5.

over, the problem of extracting the portion of the costs of multi-purpose physical facilities and of joint activities to attribute to the education services provided is prolix.

In addition to these problems with what is sometimes called the "direct" resource costs of college, there is also the "opportunity cost" component. The time of college students, unlike that of elementary and most high school students, could be used to produce significant amounts of income in the economy. For example, in 1983 the average male high school graduate (18 to 24 years old), working year round at a full-time job, earned almost $13,000, which probably understates what the typical college student would earn if he had not attended college.

The importance of the opportunity cost element in the cost of college cannot be overstressed. Chapter 5 presents an analysis of the issues of determining the optimal amount of college education for a society to have. To answer this important question the benefits of college education must be weighed against direct costs—tuition and fees, plus some part of room and board and travel—plus an estimate of the opportunity cost component. If only direct costs were used, there would be an important bias toward investing too much in college education.

Still, it is important to try to separate out the direct resource cost incurred by colleges and universities in the production of their educational services. Table 4-9 gives data that can be used to approximate the trend in these costs, if not in their level. They are the average tuition charges by private universities and colleges in the U.S. They diverge from the costs of resources actually expended by the university because even private colleges and universities do not have to recoup all their educational outlays from student charges. However they do have to cover most of their costs this way, especially at the private 4-year colleges, so that the trend in the tuition and fee charges in table 4-9 is probably indicative of the trend in the amount of real resources used per student in private higher education.

The figures indicate that resource costs per student year rose by about 45 percent between 1963 and 1982, in both private colleges and universities. It is interesting to make the same comparison that was made for trends in elementary and high school costs (table 4-5). Figure 4-6 and table 4-10 shows the ratio of tuition and fee charges to the median income of male full-time/full-year workers. After staying stable throughout most of the 60's and 70's, the ratio increased somewhat between school years 1980-81 and 1981-82. However, as noted, the elementary/secondary school ratio increased steadily over the same time period. The difference may be due to the fact that colleges have just begun to feel the burden of the enrollment decline due to the passing of the baby-boom generation. Also our figures only cover private colleges and universities. Resource cost trends in public colleges could have differed significantly from those in private schools.

Table 4-8. Associate Degrees Conferred by Institutions of Higher Education by Type of Curriculum: 1973-74 to 1980-81

Type of curriculum	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81
All curriculums	343,924	360,171	391,454	406,377	412,246	402,702	400,910	416,377
Arts and science or general programs	164,659	166,567	175,185	171,631	167,036	157,572	154,284	155,731
Occupational curriculums	179,265	193,604	216,269	234,746	245,210	245,130	246,626	260,646
Science or engineering related	94,211	102,677	110,154	119,071	125,222	125,384	128,008	139,319
Data processing technologies	6,425	6,167	6,532	7,416	8,233	9,628	11,559	14,750
Health services/paramedical	46,420	52,566	55,777	59,614	62,030	61,670	60,572	56,726
Mechanical/engineering technologies	30,865	32,198	35,840	37,967	40,780	40,584	42,816	51,268
Natural science techonologies	10,501	11,746	12,205	14,074	14,179	13,502	13,061	13,575
Nonscience and nonengineering related	85,054	90,927	106,115	115,675	119,988	119,746	118,618	121,327
Business and commerce	58,824	62,492	73,059	80,873	86,204	88,742	90,859	94,642
Public service-related technologies	262,330	28,435	33,056	34,802	33,784	31,004	27,759	26,685

Note: Data include only degrees requiring at least 2 years but less than 4 years of work beyond high school.

Source: National Center for Educational Statistics, *Digest of Education Statistics, 1983-84*, table 118.

ENROLLMENT OUTLOOK

What is the outlook for post-secondary education? Figure 4-7 shows the size of the 18- to 24-year-old population from 1960 to 2050. It is clear that the pool from which college students are drawn is going to continue shrinking until the end of the century. The only demographic assumptions that underlie the projections up to year 2000 are immigration rates and mortality rates. Thus if enrollment rates do not rise during the 80's and 90's, higher education will face declining enrollment.

Table 4-9. Tuition and Fee Charges at Private Universities and 4-Year Colleges: 1963-64 to 1983-84

School year	Current dollars		Constant 82 dollars	
	University	4-year college	University	4-year college
1963-64	1,216	935	3,805	2,925
1970-71	1,981	1,603	4,813	3,894
1975-76	2,881	2,084	5,011	3,625
1977-78	3,354	2,362	5,169	3,640
1979-80	3,811	3,014	4,737	3,746
1980-81	4,275	3,384	4,764	3,771
1981-82	4,900	3,883	5,025	3,982
1982-83	5,583	4,329	5,488	4,255
1983-84	6,079	4,699	5,743	4,460

Source: Donald A. Gillespie and Nancy Carlson, *Trends in Student Aid: 1963-83*, (The Washington Office of the College Board, Dec. 1983), p. 39, tables 4-9 and A-10 and "Trends in Student Aid: 1980-84," *UPDATE* (Washington Office of the College Board). Data for 1983-84. All estimates based on preliminary data.

Analysis in chapter 5 suggests that the pecuniary gain from going to college has started to move up since 1979, especially for young graduates. This may keep the enrollment picture for colleges from becoming as bleak as is indicated by the demographic data.

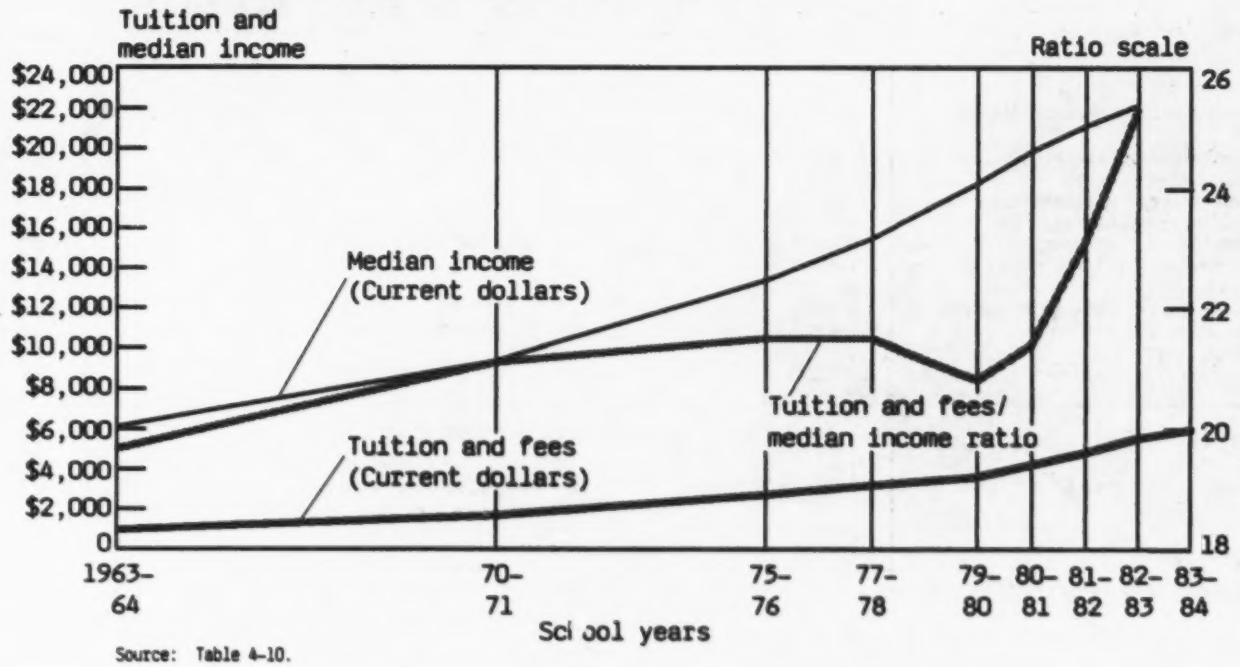
A 1981 study by Easterlin et. al.[8] stressed variables other than the pecuniary gain from college. Their study projected significant increases in enrollment rates for the late 80's and 90's. Their projections were based on estimates of what the effects had been in the past of changes in parent's income, cohort size, and other variables, on college enrollment rates of the 18- to 24-year-old age group. Given these estimates the authors based their projections primarily on assumptions about the magnitude of growth in parent's income in the future. There are three sources of uncertainty here—the validity of the estimates of the behavioral parameters (e.g., the effect of changes in parental income on enrollment); the validity of the assumptions about the future course of parental income and other variables; and the inability to predict the course of other important determinants of enrollment—e.g., the demand for skills produced by colleges might greatly accelerate or decline.

As of 1983, the latest date for which enrollment data are available (table 5-7, chapter 5) the enrollment rates for males (18 to 24 years old) had inched up from 25.8 percent in 1979 to 27.3 percent, and for females from 24.2 to 25.1. Unfortunately it is not possible to judge the validity of the Easterlin model from this data because average family income actually fell over this period. However, many economists are predicting a revival in worker-hour productivity growth in the late 80's and 90's. This would lead to significant

[8] D. Ahlburg, E. Crimmins, and R. Easterlin, "The Outlook for Higher Education: A Cohort Size Model of Enrollment of the College Age Population, 1948-2000," *Review of Public Data Use*, Vol. 9 (1981), pp. 211-227.

FIGURE 4-6.

Tuition and Fee Charges at Private Universities, Median Income of Male Full-Time, Full-Year Workers, and Ratio: 1963-64 to 1983-84



Source: Table 4-10.

Table 4-10. Ratio of Tuition and Fee Charges at Private Universities to the Median Income of Full-Year, Full-Time Male Workers: 1963-64 to 1983-84

(Figures in current dollars)

School year	Tuition and fees (1)	Median income of FT/FY workers (2)	Ratio: (1)/(2) X 100 (3)
1963-64	1,216	6,177	19.7
1970-71	1,981	9,407	21.1
1975-76	2,881	13,396	21.5
1977-78	3,354	15,566	21.5
1979-80	3,811	18,326	20.8
1980-81	4,275	19,932	21.4
1981-82	4,900	21,173	23.1
1982-83	5,583	22,081	25.3
1983-84	6,079	(NA)	(NA)

Sources: Tutition and Fees, Donald A. Gillespie and Nancy Carlson, *Trends in Student Aid: 1963-83,* (The Washington Office of the College Board, Dec. 1983) and "Trends in Student Aid: 1980-84" *UPDATE,* (Wash. Office of the College Board). Data for 1983-84 are preliminary.

Median Income, U.S. Bureau of the Census, Current Population Reports, Consumer Income, P. 60, *Money Income and Poverty Status of Families and Persons in the U.S.*: various years. Calendar year data were averaged to obtain values shown.

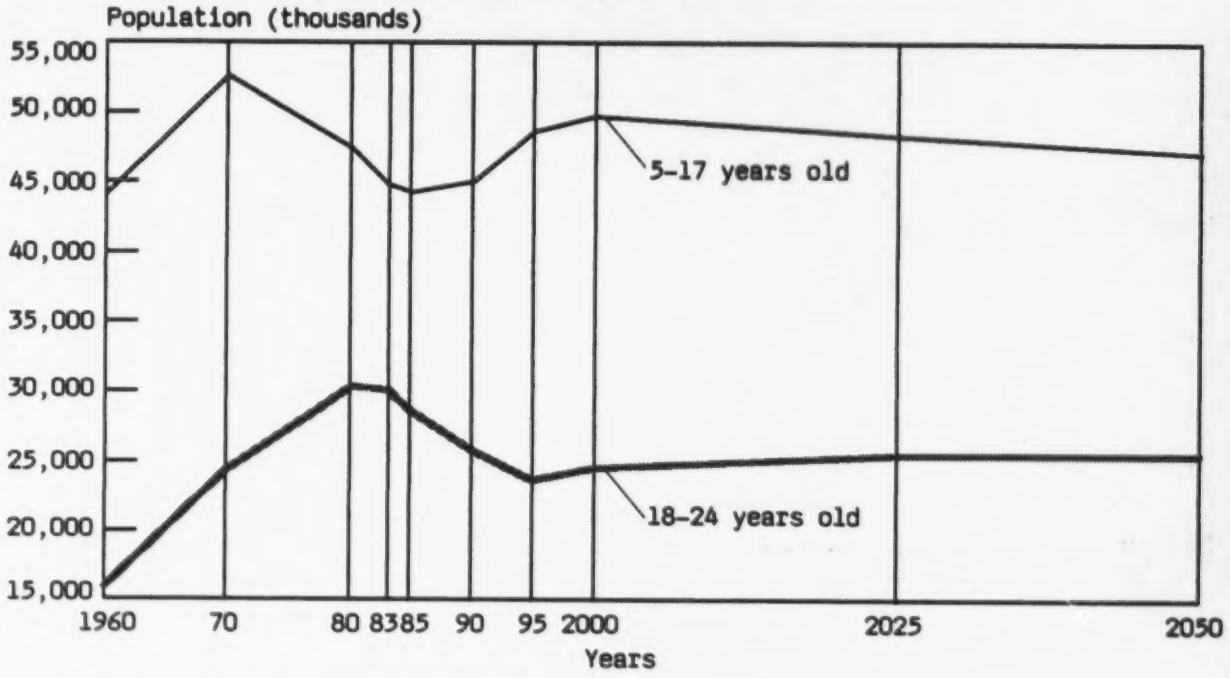
growth in family (and parent) incomes and, if the Easterlin model is right, to a growth in enrollment rates.

Figure 4-7 also shows the outlook for the demographic determinants of future enrollments in elementary and secondary schools. These schools appear to be close to passing their period of post-baby-boom drought, and will soon be caught up in the "mini-boom" of babies of the baby boomers themselves, who are now becoming parents. Thus by 1985, or slightly after, a trough will be reached for the elementary school age group in the long decline that set in during the 1970-75 period. For the secondary school age group, the decline period will be dragged out somewhat longer. Thus like post-secondary schools, the lower secondary schools will still have to battle declining enrollments, but for a much shorter time period. Indeed after 1985, and continuing to the mid-90's, elementary school enrollment (K-8th grade) will be rising, increasing by about 14 percent over the entire period. This will create a demand for additional teachers and may require an above-average increase in compensation for teachers.[9] However, our analysis of trends in student/teacher ratios suggests that some of the increase in enrollment can be handled by allowing class size to increase somewhat.

[9] C. F. Manski, *Academic Ability, Earnings, and the Decision to Become a Teacher,* (National Bureau of Economic Research, Working Paper No. 1539, Jan. 1985). This study concludes that the number of people going into teaching would respond substantially to an increase in teacher's pay.

FIGURE 4-7.

Population Trends and Projections for 5- to 17-Year Olds and 18- to 24-Year Olds: 1960-2050



Source: Table A-7.

Chapter 5.
College Education and the Economy

In this country, there is little discussion or debate about what fraction of each cohort of young people should finish high school and get a diploma or some kind of equivalent. It is generally agreed that, given the level of income of our country, the various benefits, economic and otherwise, to the individual and society of finishing high school, justify the outlay of public funds. Nowadays no one speaks of a potential "glut" of high school graduates.

However, with college education the situation is quite different. At present, there is much concern about a glut of college graduates. People, although recognizing that college education can have economic value, are concerned that this value will not hold up if too many people get college educations. However, in the late 50's and early 60's the situation was reversed. Then there was concern about "underinvestment" in college education, and people thought that the economic contribution of additional college graduates would be so great that the government should encourage more individuals to go.

Clearly the accurate measurement of economic effects is of great importance for guiding public policy toward college education. Even our country is not rich enough to give a college education to every person and neither do we feel completely sure that the labor market for college graduates will function to generate the socially optimal number of graduates—in short, both gluts and shortages are possible.

This chapter reviews the concepts and empirical data relevant to the question: "Do we have the optimal amount of college graduates?" The first section briefly lays out a framework for analyzing the relationship between college education and the economy. Then a review of empirical studies of whether we have had over- or underinvestment in college education in the past is presented. The final section brings together data on the question of whether we have an oversupply of college graduates today, and are likely to in the near future.

ECONOMIC FRAMEWORK

The relationship between college education and the economy has at least three aspects. The one that has been recognized for the longest time is that colleges are the source of most highly skilled labor which the economy requires for peak performance.

In addition to the traditional professions of law and medicine, there is the whole panoply of science and engineering professions and business specialties. In recent years, the computer has generated demands for large numbers of people so highly trained in computers, that in 1980 over 11 thousand bachelor's degrees, over 3,000 masters degrees, and 250 doctorates were awarded in computer sciences, a relatively new addition to the professions.

In addition to providing highly skilled labor to the economy under given conditions of technology, college education plays a vital role in helping the economy adapt to technical and other changes. As technical change propels the economy to high levels of potential productivity, demands for highly trained workers tends to increase, or at a minimum the mix of types of skills in demand will change. If the flow of highly skilled workers from the colleges does not respond as rapidly as possible, the rate of productivity growth actually realized will be less than the potential established by technical advance.

The foregoing two aspects describe the college-economy relationship as one in which the colleges adapt to the changing needs of the economy. However, since the mid-50's and the launching of Sputnik by the Soviets, the role of colleges and college education in contributing to technical progress directly has also been the subject of intensive research. Our discussion below will mainly be relevant for evaluating college education in its adaptive role vis-a-vis the economy. The analysis of how college education contributes to technical change primarily involves the study of three occupational categories—scientists, engineers, and industrial managers—and how the quality of their college and graduate training contributes to the discovery and diffusion of innovations throughout the economy.[1]

Given these important interrelationships, how can we be sure the optimal number of college graduates (with the right skill mix) will flow into the economy each year? One approach is to postulate a market mechanism similar to the one used to analyze investments in physical capital by businessmen. Labor markets generate earnings differentials or premiums for certain skills and occupations, and individuals will perceive the gain and react by both going to college and by changing their courses of instruction in college.[2]

However, we are much more concerned about the efficiency of the market mechanism in the case of college edu-

[1] Edwin Mansfield, *Education, R&D, and Productivity Growth* (Mimeo, University of Pennsylvania).

[2] Richard Freeman, *The Labor Market for College Trained Manpower*, (Harvard Univ. Press Cambridge, Mass. 1971) presents some strong empirical evidence that the market model is relevant for analyzing individual's decisions about college degree.

cation, than they are for other investments. This is because unlike investments in physical capital made by businessmen, investments in "human" capital are made by individuals who are much less informed about the factors underlying the returns on this investment than the typical businessman is about his investments. Moreover it is felt by some researchers that there may be significant external benefits to the economy that are not reflected in higher earnings for the graduate. The possible direct impact of college graduates on technical change just mentioned is the primary source of these benefits. Finally, many feel that private financial markets may be very imperfect when it comes to channeling other people's funds into human capital investments like college education, as opposed to the typical business investment in plant and equipment.

The strength of these concerns is reflected in the long-standing tradition in this country of subsidizing college students. Currently the college costs of many students are subsidized in part by Federal, State, and local governments and by private sources in a variety of ways—guaranteed student loans, grants to students from low-income families, subsidized tuition charges at State and municipal colleges, and private endowments that allow private colleges to charge lower tuition.

What is the right amount of subsidy? One criteria is that the flow of college graduates into the economy keeps the total pecuniary returns (gains to the individual plus external benefits to society) on dollars invested in college training (including both the subsidies and the costs born by students), at the same level as that earned by investments in other resources like physical capital and research and development.[3]

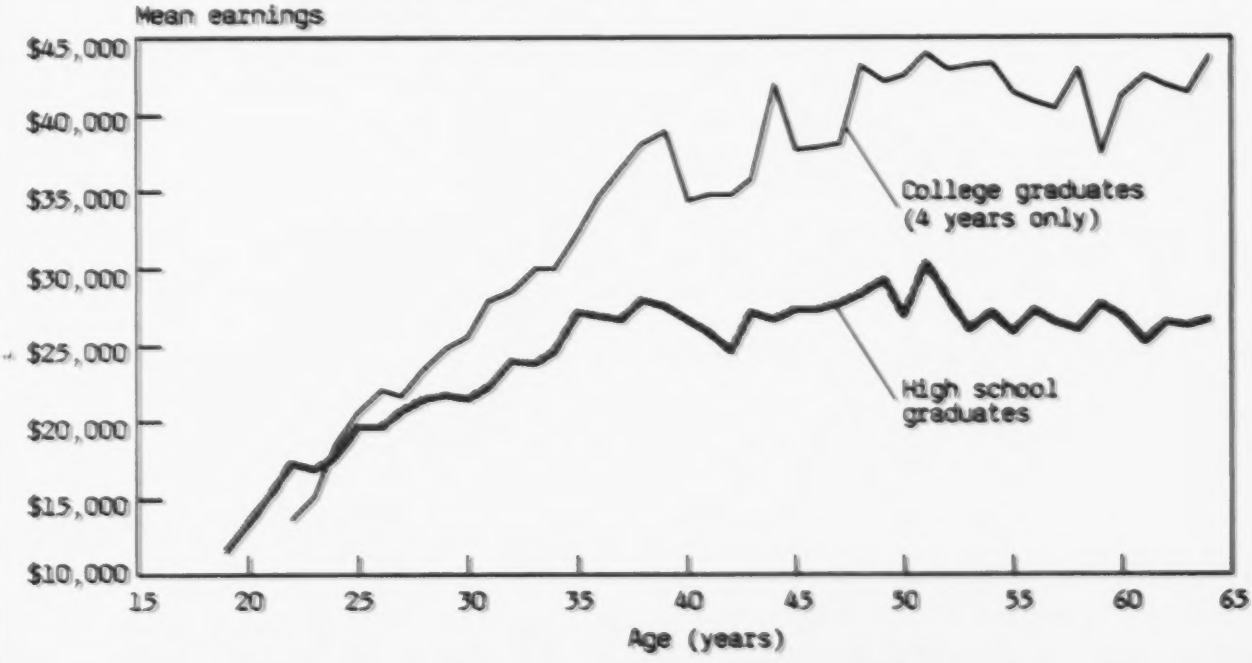
Thus it is important to try and estimate the pecuniary return that could be expected by recent college graduates. If it is found to be below the rate on alternative investments, this would be some indication of overinvestment in college training, although unmeasured external benefits to society might still make the total pecuniary return equal to or higher than on alternatives. However, if the estimated pecuniary return to the individual were higher than on alternatives, we can be sure there is underinvestment since any external benefits would only increase the return to college education.

The pecuniary return from college is dependent on the size of the annual earnings differential at different ages between

[3] As noted in chapter 2 (note 4), college education can also produce important noneconomic benefits, both to the individual and society. Our discussion is limited to those effects of college education that raise the productivity and earnings capacity of the graduate and possibly of other workers and resources in the economy via external economic effects.

FIGURE 3-1.

Mean Earnings of Male Year – Round, Full – Time Workers, by Age: 1979



Source: Table A-8.

high school and college graduates of the same ability, the cost of college to the student (including opportunity cost) and the number of years he can expect to be in the labor force.[4] The data in figure 5-1 can be used to explain the general approach used to estimate the pecuniary return to college education.

The data show the mean earnings by age in 1979[5] of male workers who were either high school graduates or college graduates at the time of the survey, and who had worked at a full-time job for a full year during 1979. The problem is to adjust these data so that they approximate the alternative lifetime earnings streams that could be expected by the average high school graduate trying to decide whether to go on to college in 1979. The most difficult adjustment problem is for differential ability. The average college graduate is very likely to have earned more than the average high school graduate even if he had not gone on to college. Thus the earnings differentials at each age overstate the earnings gain from college and the degree of overstatement may vary with age if there have been trends in the ability differential. Then these "cross-sectional" age-earnings profiles have to be adjusted for changes that an actual cohort of individuals will experience as it ages through time. Adjustments for mortality, inflation and the effect of economy wide productivity growth on earnings have to be made. In addition, some adjustment for (or assumption about) past trends in the quality of college education relative to high school education must be made. Individuals who were 50 in 1979 went to school 25 to 35 years ago, and the relative quality levels may have changed since then.

The resulting pair of adjusted age-earnings profile can then be combined with estimates of the total cost of college (direct plus opportunity) to estimate the net pecuniary gain from going to college. Either the earnings differentials at each age can be discounted (using a rate of interest at which the student can borrow money), and the sum of these discounted values can be compared to the cost at a common point in time, or an "internal rate of return" can be computed, which is the rate of discount that equates the present discounted value of the earnings gain with the cost.[6] As noted, efficient market performance requires that the rate of return to college education should not be out of line with returns to other investments and that changes in the return will call forth changes in enrollment levels.

In practice, only crude adjustments have been possible for the ability differential so that the empirical estimates of the pecuniary return are subject to a margin of error. However, changes over time in the estimates can still be a reliable indicator of the direction of change in the pecuniary return to college.

EMPIRICAL STUDIES

An early and well known study of the pecuniary return to college education, by Professor Gary Becker, concluded that its level appeared about the same as that earned by physical capital.[7] He concluded that, at that time, there was no evidence of underinvestment in college education based on the individual student's earnings gain. However, from society's point of view the situation was more problematical. As noted, certain classes of college graduates (scientists, engineers, business managers) may affect the rate of technical progress directly by discovering and helping to diffuse new innovations. These graduates may produce external benefits to society, which are not fully reflected in higher earnings for them. These external benefits are very hard to measure, so it is hard to know the total social return to college education. However, Becker's conclusion that there was no underinvestment probably was valid for the bulk of college graduates in other fields of specialization. It is much more difficult to make a convincing case for external benefits from the average college degree granted.

A more recent study by Freeman concluded that there was a significant fall in the economic return to male college graduates that set in around 1969 and continued up until 1972 which was the time Freeman completed his study.[8] Freeman concluded that there was some overinvestment in college education in the late 60's, but that enrollments were beginning to adjust downward between 1969 and 1972. However, although most people agree that there was a decline in the return during this period, there is some dispute over the cause of the observed decline. Freeman attributed it to shifts in demand for college graduates originating in some industrial or technical changes in the economy. Another economist, Finis Welch, argued that it could well have been the baby-boom generation first entering the labor market in the late 60's that caused the decline.[9] He argues that experience is more valuable to college than to high school graduates so that the excess supply of inexperienced people in general that was caused by the baby-boom groups entering the labor force, would weigh most heavily on the earnings of young college graduates.

THE CURRENT SITUATION

What does the situation look like today with the benefit of 12 more years of evidence? Table 5-1 shows the incomes of male college and high school graduates, 25 to 34 years old from 1958-83. The period of decline in return identified

[4] The Census Bureau periodically publishes estimates of lifetime earnings by education level that are illustrative of the magnitude of the gain in earnings from different levels of education. However, they are only illustrative because the census does not adjust the age-earnings profiles for differences across education groups in other factors that determine earnings—e.g., inherited ability. See source for table 5-1.

[5] 1979 is used in order to abstract from the effects of the business cycle on the earning differential between college and high school graduates. College graduates usually are less effected by recessions.

[6] For judging the overall efficiency of markets, the individual's private returns should be equated to the full social cost of his education—i.e., subsidies should be added to costs born directly by the student. However, for understanding the behavior of student (i.e., changes in enrollment rates), the return earned on private costs only is more relevant.

[7] Gary S. Becker, *Human Capital*, (National Bureau of Economic Research, New York, 1957).

[8] Richard Freeman, "Overinvestment in College Education," *Journal of Human Resources*, Volume X, #3, Summer 1975; and *The Over-Educated American*, (New York, Academic Press, 1976).

[9] Finis Welch, "Effects of Cohort Size on Earnings: The Baby Boom Babies' Financial Bust," *Journal of Political Economy*, Vol. 87, #5, Pt.2, October 1979.

by Freeman is apparent in the data.[10] The ratio of college/high school graduate incomes dropped after 1969 and stayed at the somewhat lower level until 1979. Since 1979, there has been a rather sharp rise in the income ratio. The data in table 5-2 indicate that the sharp rise in the ratio after 1979 was not all due to college graduates suffering less from unemployment during the 1979-82 recession. This table shows the earnings of workers who worked a full year (50 or more weeks) at a full-time job. The same rise as in the income data, although somewhat less sharp, is apparent. Thus the economic return to college education may be on the rise. However, as noted, it is important to distinguish two sets of forces that may have been influencing the return to college during the 70's. One was demographic—the flood of the baby-boom babies into the labor market beginning in the late 60's. The other is possible shifts in the demand for college education due to changes in the economy. Since the baby-boom flood started to recede sometime in the late 70's, it is likely that this factor is contributing at least a part of the increase in the income ratio since 1979. Table 5-3 shows the same kind of earnings data as in table 5-1 (i.e., for full-time, full-year workers) but broken down by fairly detailed age groups, for the period 1979-82. It is clear that the strongest positive trends are in the youngest age groups, which is consistent with the baby-boom hypothesis. However, one cannot rule out the possibility of demand shifts, even though we would expect this type of factor to raise the earnings all vintages of college graduates not just the most recent one. Clearly more research is needed to determine the significance of the recent rise in the college/high school graduate earnings ratio among young college graduates.

[10] Data on the earnings differentials by education for only one age group is only a proxy for data on the entire life cycle pattern of earnings differentials. We are assuming that cohorts of college graduates who experience a higher earnings ratio at 25 to 34 years old expect to experience a higher ratio throughout their working life. Also we have not investigated in detail whether or not increased costs of college would cancel out the effect of changes in earnings gain on the overall pecuniary return. However, it does appear that the earnings gain changes since 1979 have been greater than cost changes.

Table 5-1. Median Income of Male College and High School Graduates 25 to 34 Years Old, With Income During the Year: 1958-83

(Figures in current dollars)

Year	College graduates (1)	High school graduates (2)	Ratio (1)/(2) (3)
1958	5,970	4,688	1.27
1961	6,640	5,175	1.28
1963	6,947	5,612	1.24
1965	7,474	6,151	1.21
1967	8,762	6,882	1.27
1969	10,228	8,008	1.28
1971	10,908	8,558	1.27
1973	12,349	10,153	1.22
1975	13,232	10,767	1.23
1979	17,345	14,280	1.21
1981	20,589	15,393	1.34
1982	21,149	15,298	1.38
1983	21,988	15,789	1.39

Source: U.S. Bureau of the Census, Current Population Reports, Series P-60, *Consumer Income of Families and Persons in the U.S.*, for each year.

Table 5-2. Mean Earnings of Male College and High School Graduates 25 to 34 Years Old Who Worked Full Time, Full Year: 1979-83

(Figures in current dollars)

Year	College graduates (1)	High school graduates (2)	Ratio (1)/(2) (3)
1979	20,726	16,292	1.27
1981	24,163	18,187	1.33
1982	25,651	18,728	1.37
1983	26,621	19,242	1.38

Source: U.S. Bureau of the Census, Current Population Reports, Series P-60, *Consumer Income of Families and Persons in the U.S.*, for each year.

In one respect, the rising college/high school earnings ratio is perhaps surprising. It goes counter to the recent spate of articles decrying a possible glut of college graduates.[11] These reports were mainly based on analyses of the occupational distribution of recent college graduates. Recent college graduates appeared to be in jobs that usually have not required college training. Table 5-4 shows data on the occupational distribution of college graduates (25 to 44 years old) over the period 1950-82. Most all college graduates tend to be in two of the major occupetional categories—professional, technical and kindred workers, and managers and administrators excluding farm. The percent of male college graduates in these two categories was 73.1 in 1950, 74.9 in 1960, 80.2 in 1970, and 74.2 in 1982. Thus between 1970 and 1982, there was definitely a decline in the proportion of male college graduates in the two major occupational categories that contain the jobs typically associated with college graduates. A decline after 1970 is consistent with the work of Freeman, discussed above, and the decline in the college/high school income ratio after 1969 in table 5-2.

Table 5-5 contains summary data on the occupational distribution of male college graduates from the Current Population Survey, for the years 1970, 1974, 1979, and

[11] For a very outspoken example: W.C. Robinson, "Educational Disinvestment" *Policy Review*, Fall 1983), 626.

Table 5-3. Ratio of Mean Earnings of Male College Graduates and Male High School Graduates Who Worked Full Time, Full Year, by Detailed Age Category: 1979-83

Year	25 to 29 years old	30 to 34 years old	35 to 39 years old	40 to 44 years old	45 to 49 years old	50 to 54 years old
1979	1.17	1.31	1.56	1.60	1.61	1.63
1980	1.17	1.29	1.50	1.55	1.65	1.67
1981	1.23	1.36	1.44	1.57	1.63	1.66
1982	1.29	1.39	1.43	1.51	1.68	1.75
1983	1.32	1.39	1.53	1.63	1.61	1.74

Source: U.S. Bureau of the Census, Current Population Reports, Series P-60, *Consumer Income of Families and Persons in the U.S.*, for each year.

1982. The data for 1982 were taken from table 5-4. It would appear that although the occupational distribution declined between 1970 and 1982, the rate of decline in the occupational mix of college graduates has definitely slowed down. Thus the occupational data may not be inconsistent with the rise in the college/high school earnings ratio since 1979 shown in tables 5-1, 5-2, and 5-3.

Data in table 5-6 show college enrollment trends by sex. These data may also provide some insight into the workings of the college graduate labor market. The decline in enrollment rates for males is what Freeman saw part of—between 1969 and 1972.[12] Note however, that the male decline appears to have bottomed out in the most recent years. Note also the uptrend in enrollment rates for females, at least until 1976.

One gap in Freeman's analysis was the treatment of the special situation of women in the college graduate labor

[12] Because of the existence of the draft and the military buildup starting in the mid-60's, the extent to which young men voluntarily chose to reduce college going, in response to declines in the pecuniary return between 1969 and the mid-70's, is overstated by the numbers in table 5-6. The draft may have drawn more heavily on noncollege-going young men and some of those who were not bound for college were induced to enroll to avoid the draft. Both effects would tend to raise the 1969 civilian population enrollment rate vis-a-vis 1972 and later years when draft calls were low or nonexistent.

Table 5-4. Employed College Graduates, 25 to 44 Years Old, by Occupation and Sex: April 1950, 1960, and 1970 Censuses, and March 1982 CPS

(Numbers in thousands)

Occupation and sex	1950	1960	1970	March 1982 CPS
Male	1,700	2,806	3,979	7,971
Percent	100.0	100.0	100.0	100.0
Professional, technical, and kindred workers	56.5	58.5	61.4	50.6
Managers and administrators, except farm	16.6	16.4	18.8	23.6
Sales workers	8.2	9.1	8.7	8.9
Clerical and kindred workers	6.7	5.6	4.4	4.3
Craft and kindred workers	1.4	3.9	3.1	5.1
All other occupations	10.6	6.5	3.7	7.5
Female	649	813	1,511	5,009
Percent	100.0	100.0	100.0	100.0
Professional, technical, and kindred workers	70.3	74.8	80.3	61.0
Managers and administrators, except farm	3.7	3.1	3.9	11.2
Sales workers	2.5	1.6	1.9	5.0
Clerical and kindred workers	17.9	13.6	10.8	14.4
Craft and kindred workers	0.5	0.4	0.4	1.3
All other occupations	5.1	6.5	2.7	7.1

Sources: 1950: Population Census, Vol. IV, Special Reports, Pt. 5, *Education*, table 11.
1960: Population Census, Vol. II, Special Reports, Pt. 5A-5C, *Education*, table 8.
1970: Population Census, Vol. II, Special Reports, Pt. 5A-5C, *Education*, table 11.
1982: March 1982 CPS, unpublished obtained from the Education Branch, Bureau of the Census.

market. Because of serious conflicts between an uninterrupted career and child-rearing responsibilities as well as possible labor market discrimination, most women college graduates have earned a very low pecuniary return on their investment—much lower than the average male college graduate has. However, as more and more women were shifting into career-oriented life styles the number of them who would find a college education profitable increased.

Thus it is not necessarily contradictory to see women increasing their investment in college education even as males were decreasing theirs. The decline in the return to college graduates, that set in around 1969, did not deter women because their pecuniary return was at the same time being increased by their decision to alter their life styles and pursue careers more continuously. Women from the top part of the ability distribution and with a taste for the nonpecuniary returns from college were able to anticipate a high return even as men from the lower part of the ability distribution and with little taste for college per se, were experiencing declines in returns.

However, it is important to stress that since 1979, there are signs that the market for college graduates may be improving for both men and women. The enrollment rates in table 5-6 suggest a slight upturn and recent informal reports suggest that 1983-84 enrollment rates will be even higher.[13]

Table 5-5. Percent of Male College Graduates 25 to 44 Years Old in the Categories Professional, Technical, and Kindred Workers; or Managers and Administrators; Excluding Farm: 1970-82

Year	Percent
1970	84.3
1974	79.4
1979	75.4
1982	74.2

Source: U.S. Bureau of the Census, Current Population Reports, Series P-20, *Educational Attainment in the United States*, March of each year.

Table 5-6. Percent of Civilian Noninstitutional Population* 18 to 24 Years Old Enrolled in College, by Sex: 1969-83

(October of each year)

Year	Total	Female	Male
1969	27.3	20.9	35.1
1972	25.4	21.2	30.2
1976	26.9	25.2	28.2
1979	25.0	24.2	25.8
1981	26.1	25.2	27.1
1982	26.6	26.0	27.2
1983	26.2	25.1	27.3

*Excludes persons in the Armed Forces (see footnote 12 in chapter 5).

Source: U.S. Bureau of the Census, Current Population Reports, Series P-20, *Social and Economic Characteristics of Students*, October of each year.

[13] The College Placement Council conducts periodic surveys of employers of college graduates in all sectors of the economy. They collect data on hiring intentions and on salary offers made to students soon to graduate. The results of their most recent surveys also suggest that the market for college graduates may be in for a long-term revival. See their periodic publication, *Recruiting '85*, College Placement Council Inc., 62 Highland Ave., Bethlehem, PA, 18017.

Chapter 6.
Summary and Outlook

The survey of trends and current concerns has provided a sketch of what has happened in the past and clarified some current issues. It also may provide some insight about the future and what can be done.

SUMMARY OF FINDINGS

The survey of attainment trends showed how very large has been the increase in attainment since 1940 and how much more educated Americans are relative to other developed nations. We found benefits to society in reduced inequalities in attainment itself and contributions to economic growth, both of individuals and the economy as a whole. We also showed that the lack of decline in individual income inequality did not necessarily imply that increases in education did not have significant effects on the earnings of the individuals attaining it.

The survey of achievement score trends and differentials revealed a sizeable decline since the mid-60's as well as large and persisting differentials by various socioeconomic groups. A gap in the way current achievement data is reported precludes systematic measurement of the size of the "functionally illiterate" population. Existing studies lead to the conclusion that the quality of schooling in the U.S. actually did decline during the 70's. At present, a "back to basics" movement seems to be sweeping most school systems in an attempt to reverse this decline. (The most recent reports do not sound that optimistic however, see below.)

The survey of resource use and costs discovered a very sharp rise in cost per student in public elementary and secondary schools starting in the early 60's—real cost per student rose by significantly more than the rise in the average family's real income. The continued increase in the 70's was not due to an increase in the relative salaries of teachers or in the real income of parents. A rise in teachers per student, closely associated with passing of the baby-boom generation to older ages, underlay the continued cost per student increase. Recent studies suggest that after a long lag, public school systems do begin to adjust to enrollment declines by reducing excess classroom teachers. Much more study of resource management in public school systems is needed, as well as comparisons with private schools.

The analysis and survey of college education and the economy found that the pecuniary return to college education had declined in the late 60's and early 70's, possibly due in part to the surge of inexperienced college graduates into the labor market as the baby-boom generation entered the labor force. In addition, more detailed analysis of data on income by age and education suggests that factors other than the baby boom were also at work—i.e., shifts in the demand for occupations requiring college training.[1] However, recent movements in data on income earnings and occupation cross-classified by education attainment, suggest that the return to college education may be on the rise, which is consistent with the fact that the large baby-boom cohorts are now passing into the older adult age groups. It was concluded that, in general, the widespread concern about gluts of college graduates may be unwarranted.

OUTLOOK

Aside from the future enrollment situation, which was briefly discussed in chapter 4, the two most important aspects for the future stressed in our report appear to be the continuing of the efforts by school systems to reverse the decline in the quality of schooling, and preparation to help accommodate possible changes in the market for college graduates.[2]

As noted, the flood of new reports over the past year noting more and more school districts adopting reforms recommended by the two high level commissions, suggested a good start on the problem of reversing the decline. However two very recent articles sound a pessimistic note.[3] They indicate that basic institutional rigidities and the natural human resistance to change, may be slowing down the pace of real change.

The analysis of the college graduate labor market suggested that, contrary to most current opinion, the market for college graduates may be reviving. At the least, it is recovering from the pressures of the baby-boom generation as they move on to older age groups. What of the future? Recent Bureau of Labor Statistics (BLS) occupational projections through the 90's indicate a slight excess of new college graduates over the number of college-level jobs they project.[4] However, the BLS projections essentially extrapolate past trends, and it is very possible that these may be unrepresentative. The pace and character of future technical advances can never be fully anticipated, and they may turn out to be very favorable to college graduates.

[1] Dave M. O'Neill, *Some Economic and Social Aspects of the Baby Boom.* (Unpublished mimeo, available from the author on request).

[2] The narrowing of the achievement differentials between socioeconomic groups is of course another important concern for the future.

[3] Gilbert T. Sewall, "We've Barely Cracked the Book on School Reform," *The Wall Street Journal*; Gene 1. Maeroff, "The Tidal Wave of Reform in Education May Be a Washout," *The New York Times*, Sunday, May 6, 1984.

[4] Samuel M. Ehrenhalt, "Graduates and Jobs," *Challenge*, July/August 1983.

Appendix Tables

Table A-1. Median School Years Completed by Persons in Selected Age Groups, by Race and Sex: 1940-84

Year	Total		Race		Sex			
			25 years old and over		25 years old and over		25 to 34 years old	
	25 years old and over	25 to 29 years old	White	Black	Male	Female	Male	Female
1940	8.6	10.3	8.7	5.7	8.6	8.7	9.7	10.3
1950	9.3	12.0	9.7	6.8	9.0	9.6	11.5	12.1
1960	10.6	12.3	10.9	8.0	10.3	10.9	12.2	12.2
1970	12.2	12.6	12.1	9.8	12.2	12.1	12.6	12.5
1980	12.5	12.9	12.5	12.0	12.6	12.4	13.1	12.8
1981	12.5	12.8	12.5	12.1	12.6	12.5	13.0	12.8
1982	12.6	12.8	12.6	12.2	12.6	12.5	(NA)	(NA)
1983	12.6	12.8	12.6	12.2	12.7	12.5	13.0	12.8
1984	12.6	(NA)	12.6	12.2	12.7	12.6	(NA)	(NA)

NA Not available.

Source: U.S. Bureau of the Census, *Statistical Abstract of the U.S.: 1953* (74th ed.), Wash., D.C., 1953, table 127 and *Statistical Abstract of the U.S.: 1984* (104th ed.), Wash., D.C. 1983, tables 222 and 223, Current Population Reports, P-20, *Educational Attainment in the U.S.* #390, and forthcoming reports.

Table A-2. Percentage of Persons 25 Years Old and Over and 25 to 29 Years Old, Who Have Completed High School or More or College or More, by Age Group, Race, and Sex: April 1940 to March 1984

Year and age	All races			White			Black*		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
25 YEARS OLD AND OVER									
Completed 4 Years of High School or More									
1984	73.3	73.7	73.0	75.0	75.4	74.6	58.5	57.1	59.7
1983	72.1	72.7	71.5	73.8	74.4	73.3	56.8	56.5	57.1
1981	69.7	70.3	69.1	71.6	72.1	71.2	52.9	53.2	52.6
1980**	68.6	69.1	68.1	70.5	71.0	70.2	51.2	51.0	51.4
1980***	68.6	69.2	68.1	70.5	71.0	70.1	51.2	51.1	51.3
1979	67.7	68.4	67.1	69.7	70.3	69.2	49.4	49.2	49.5
1978	65.9	66.8	65.2	67.9	68.6	67.2	47.6	47.9	47.3
1977	64.9	65.6	64.4	67.0	67.5	66.5	45.5	45.6	45.4
1976	64.1	64.7	63.5	66.1	66.7	65.5	43.8	42.3	45.0
1975	62.5	63.1	62.1	64.5	65.0	64.1	42.5	41.6	43.3
1974	61.2	61.6	60.9	63.3	63.6	63.0	40.8	39.9	41.5
1973	59.8	60.0	59.6	61.9	62.1	61.7	39.2	38.2	40.1
1972	58.2	58.2	58.2	60.4	60.3	60.5	36.6	35.7	37.2
1971	56.4	56.3	56.6	58.6	58.4	58.8	34.7	33.8	35.4
1970	55.2	55.0	55.4	57.4	57.2	57.6	33.7	32.4	34.8
1969	54.0	53.6	54.4	56.3	55.7	56.7	32.3	31.9	32.6
1968	52.6	52.0	53.2	54.9	54.3	55.5	30.1	28.9	31.0
1967	51.1	50.5	51.7	53.4	52.8	53.8	29.5	27.1	31.5
1966	49.9	49.0	50.8	52.2	51.3	53.0	27.8	25.8	29.5
1965	49.0	48.0	49.9	51.3	50.2	52.2	27.2	25.8	29.4
1964	48.0	47.0	48.9	50.3	49.3	51.2	25.7	23.7	27.4
1962	46.3	45.0	47.5	48.7	47.4	49.9	24.8	23.2	26.2
1959	43.7	42.2	45.2	46.1	44.5	47.7	20.7	19.6	21.6
1957	41.6	39.7	43.3	40.8	41.1	45.1	18.4	16.9	10.8
1952	38.8	36.9	40.5	(NA)	(NA)	(NA)	15.0	14.0	15.7
1950	34.3	32.6	36.0	(NA)	(NA)	(NA)	13.7	12.5	14.7
1947	33.1	31.4	34.7	35.0	33.2	36.7	13.6	12.7	14.5
1940	24.5	22.7	26.3	26.1	24.2	28.1	7.7	6.9	8.4

See footnotes at end of table.

Table A-2. Percentage of Persons 25 Years Old and Over and 25 to 29 Years Old, Who Have Completed High School or More or College or More, by Age Group, Race, and Sex: April 1940 to March 1984—Continued

Year and age	All races			White			Black*		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
25 TO 29 YEARS OLD									
Completed 4 Years of High School or More									
1984	85.9	85.6	86.3	86.9	86.8	87.0	78.9	75.9	81.5
1983	86.0	86.0	86.0	86.9	86.9	86.9	79.4	78.9	79.8
1981	86.3	86.5	86.1	87.6	87.6	87.6	77.3	78.4	76.4
1980**	85.6	85.6	85.6	87.0	86.9	87.1	76.9	75.7	77.9
1980***	85.4	85.4	85.5	86.9	86.8	87.0	76.6	74.8	78.1
1979	85.6	86.3	84.9	87.0	87.7	86.4	74.8	73.9	75.4
1978	85.3	86.0	84.6	86.3	86.8	85.8	77.3	78.5	76.3
1977	85.4	86.6	84.2	86.8	87.6	86.0	74.4	77.5	72.0
1976	84.7	86.0	83.5	85.9	87.3	84.6	73.8	72.5	74.9
1975	83.1	84.5	81.8	84.4	85.7	83.2	71.0	72.2	70.1
1974	81.9	83.1	80.8	83.4	84.1	82.7	68.2	71.1	66.0
1973	80.2	80.6	79.8	82.0	82.4	81.6	64.2	63.1	64.9
1972	79.8	80.5	79.2	81.5	82.3	80.8	64.1	61.8	66.2
1971	77.2	78.1	76.4	79.5	80.8	78.3	57.5	54.1	60.7
1970	75.4	76.6	74.2	77.8	79.2	76.4	56.2	54.5	57.9
1969	74.7	75.6	73.8	77.0	77.5	76.6	55.8	59.8	52.3
1968	73.2	73.7	72.7	75.3	75.5	75.0	55.8	58.1	53.6
1967	72.5	72.1	72.9	74.8	74.3	75.3	53.4	51.7	55.0
1966	71.0	70.9	71.2	73.8	73.2	74.4	47.9	48.9	47.0
1965	70.3	70.5	70.1	72.8	72.7	72.8	50.3	50.3	50.4
1964	69.2	68.8	69.5	72.1	71.8	72.4	45.0	41.6	47.9
1962	65.9	65.8	66.1	69.2	69.2	69.3	41.6	38.9	43.8
1959	63.9	63.9	64.0	67.2	66.6	67.4	39.5	40.6	38.6
1957	60.2	53.9	62.4	(NA)	(NA)	(NA)	31.6	27.4	35.2
1952	57.1	55.3	58.7	(NA)	(NA)	(NA)	28.1	27.9	28.3
1950	52.8	50.6	55.0	(NA)	(NA)	(NA)	23.6	21.3	25.5
1947	51.4	49.4	53.3	54.9	52.9	56.8	22.3	19.6	24.7
1940	38.1	36.0	40.1	41.2	38.9	43.4	12.3	10.6	13.8

See footnotes at end of table.

Table A-2. Percentage of Persons 25 Years Old and Over and 25 to 29 Years Old, Who Have Completed High School or More or College or More, by Age Group, Race, and Sex: April 1940 to March 1984—Continued

Year and age	All races			White			Black*		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
25 YEARS OLD AND OVER									
Completed 4 Years of College or More									
1984	19.1	22.9	15.7	19.8	23.9	16.0	10.4	10.4	10.4
1983	18.8	23.0	15.1	19.5	24.0	15.4	9.5	10.0	9.2
1981	17.1	21.1	13.4	17.8	22.2	13.8	8.2	8.2	8.2
1980*	17.0	20.8	13.5	17.8	22.0	14.0	7.9	7.6	8.1
1980**	17.0	20.9	13.6	17.8	22.1	14.0	7.9	7.7	8.1
1979	16.4	20.4	12.9	17.2	21.4	13.3	7.9	8.3	7.5
1978	15.7	19.7	12.2	16.4	20.7	12.6	7.2	7.3	7.1
1977	15.4	19.2	12.0	16.1	20.2	12.4	7.2	7.0	7.4
1976	14.7	1.6	11.3	15.4	19.6	11.6	6.6	6.3	6.8
1975	13.9	17.6	10.6	14.5	18.4	11.0	6.4	6.7	6.2
1974	13.3	16.9	10.1	14.0	17.7	10.6	5.5	5.7	5.3
1973	12.6	16.0	9.6	13.1	16.8	9.9	6.0	5.9	6.0
1972	12.0	15.4	9.0	12.6	16.2	9.4	5.1	5.5	4.8
1971	11.4	14.6	8.5	12.0	15.5	8.9	4.5	4.7	4.3
1970	11.4	14.1	8.2	11.6	15.0	8.6	4.5	4.6	4.4
1969	10.7	13.6	8.1	11.2	14.3	8.5	4.6	4.8	4.5
1968	10.5	13.3	8.0	11.0	14.1	8.3	4.3	3.7	4.8
1967	10.1	12.8	7.6	10.6	13.6	7.9	4.0	3.4	4.4
1966	9.8	12.5	7.4	10.4	13.3	7.7	3.8	3.9	3.7
1965	9.4	12.0	7.1	9.9	12.7	7.3	4.7	4.9	4.5
1964	9.1	11.7	6.8	9.6	12.3	7.1	3.9	4.5	3.4
1962	8.9	11.4	6.7	9.5	12.2	7.0	4.0	3.9	4.0
1959	8.1	10.3	6.0	8.6	11.0	13.2	3.3	3.8	2.9
1957	7.6	9.6	5.8	(NA)	(NA)	(NA)	2.9	2.7	3.0
1952	7.0	8.3	5.8	(NA)	(NA)	(NA)	2.4	2.0	2.7
1950	6.2	7.3	5.2	(NA)	(NA)	(NA)	2.3	2.1	2.4
1947	5.4	6.2	4.7	5.7	6.6	4.9	2.5	2.4	2.6
1940	4.6	5.5	3.8	4.9	5.9	4.0	1.3	1.4	1.2

See footnotes at end of table.

Table A-2. Percentage of Persons 25 Years Old and Over and 25 to 29 Years Old, Who Have Completed High School or More or College or More, by Age Group, Race, and Sex: April 1940 to March 1984—Continued

Year and age	All races			White			Black*		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
25 TO 29 YEARS OLD									
Completed 4 Years of College or More									
1984	21.9	23.2	20.7	23.1	24.3	21.9	14.6	12.9	10.5
1983	22.5	23.9	21.1	23.4	25.0	21.8	12.9	13.1	12.8
1981	21.3	23.1	19.6	22.4	24.3	20.5	11.6	12.1	11.1
1980**	22.5	24.1	20.9	23.7	25.5	21.9	11.7	10.7	12.5
1980***	22.5	24.0	21.0	23.7	25.5	22.0	11.6	10.5	12.5
1979	23.1	25.6	20.5	24.3	27.1	21.5	12.4	13.3	11.7
1978	23.3	26.0	20.6	24.5	27.6	21.4	11.8	10.7	12.6
1977	24.0	27.0	21.1	25.3	28.5	22.1	12.6	12.8	12.4
1976	23.7	27.5	20.1	24.6	28.7	20.6	13.0	12.0	13.8
1975	21.9	25.1	18.7	22.8	26.3	19.4	10.7	11.4	10.1
1974	20.7	23.9	17.6	22.0	25.3	18.8	7.9	8.8	7.2
1973	19.0	21.6	16.4	19.9	22.8	17.0	8.1	7.1	8.8
1972	19.0	22.0	16.0	19.9	23.1	16.7	8.3	7.1	9.4
1971	16.9	20.1	13.8	17.9	21.3	14.6	6.4	6.4	6.5
1970	16.4	20.0	12.9	17.3	21.3	13.3	7.3	6.7	8.0
1969	16.0	19.4	12.8	17.0	20.6	13.4	6.7	8.1	5.5
1968	14.7	18.0	11.6	15.6	19.1	12.3	5.3	5.3	5.3
1967	14.6	17.2	12.1	15.5	18.3	12.7	5.4	4.2	6.3
1966	14.0	16.8	11.3	14.7	17.9	11.8	5.9	5.4	6.4
1965	12.4	15.6	9.5	13.0	16.4	9.8	6.8	7.3	6.8
1964	12.8	16.6	9.2	13.6	17.5	9.9	5.5	7.5	3.9
1962	13.1	17.2	9.2	14.3	18.7	10.0	4.2	5.7	3.0
1959	11.1	14.8	7.6	11.9	15.9	8.1	4.6	5.6	3.7
1957	10.4	13.5	7.5	(NA)	(NA)	(NA)	4.1	3.3	5.0
1952	10.1	13.8	6.7	(NA)	(NA)	(NA)	4.6	3.2	5.8
1950	7.7	9.6	5.9	(NA)	(NA)	(NA)	2.9	2.4	3.2
1947	5.6	5.8	5.4	5.9	6.2	5.7	2.8	2.6	2.9
1940	5.9	6.9	4.9	6.4	7.5	5.3	1.6	1.5	1.7

NA Not available.
*Data are for Black and other races for 1940 to 1962; for 1963 to 1981, data are for Black persons only.
**Controlled to 1980 Census base.
***Controlled to 1970 Census base.

Source: U.S. Bureau of the Census, Current Population Reports, Series P-20, #390, *Educational Attainment in the United States: March 1980 and 1981*, and Series P-20, (forthcoming).

Table A-3. Scholastic Aptitude Test Score Means: 1951-52 to 1983-84

Academic year*	SAT- Verbal		SAT- Mathematical	
	All candidates**	High school seniors***	All candidates**	High school seniors***
1951-52	476	(NA)	494	(NA)
1952-53	476	(NA)	495	(NA)
1953-54	472	(NA)	490	(NA)
1954-55	475	(NA)	496	(NA)
1955-56	479	(NA)	501	(NA)
1956-57	473	(NA)	496	(NA)
1957-58	472	(NA)	496	(NA)
1958-59	475	(NA)	498	(NA)
1959-60	477	(NA)	498	(NA)
1960-61	474	(NA)	495	(NA)
1961-62	473	(NA)	498	(NA)
1962-63	478	(NA)	502	(NA)
1963-64	475	(NA)	498	(NA)
1964-65	473	(NA)	496	(NA)
1965-66	471	(NA)	496	(NA)
1966-67	467	466	495	492
1967-68	466	466	494	492
1968-69	462	463	491	493
1969-70	460	460	488	488
1970-71	454	455	487	488
1971-72	450	453	482	484
1972-73	443	445	481	481
1973-74	440	444	478	480
1974-75	437	434	473	472
1975-76	429	431	470	472
1976-77	429	429	471	470
1977-78	(NA)	429	(NA)	468
1978-79	(NA)	427	(NA)	467
1979-80	(NA)	424	(NA)	466
1980-81	(NA)	424	(NA)	466
1981-82	(NA)	426	(NA)	467
1982-83	(NA)	425	(NA)	468
1983-84	(NA)	426	(NA)	471

NA Not available.
*Refers to the academic year the test takers were seniors in high school.
**An individual is counted as many times as he or she is tested.
***Each candidate is counted only once, using latest score earned (for 1967 to 1971 the figures are estimated; for 1972 on they are actual).

Source: *On Further Examination*, Report of the Advisory Panel on the Scholastic Aptitude Test Score Decline, (College Entrance Examination Board, New York, 1977) for 1951-77: Howard Wainer, 'An Exploratory Analysis of Performance on the SAT,' *Journal of Educational Measurement*, (forthcoming) for 1978-82; College Board Press Release, March 1984 for 1983 and 1984.

Table A-4. SAT Averages by Ethnic Group: 1975-76 to 1983-84

Ethnic group	1975-76	1976-77	1977-78	1978-79	1779-80	1980-81	1981-82	1982-83	1983-84
VERBAL									
American Indian	388	390	387	386	390	391	388	388	390
Black	332	330	332	330	330	332	341	339	342
Mexican-American	371	370	370	370	372	373	377	375	376
Asian-American	414	406	401	396	396	397	398	395	398
Puerto Rican	364	356	349	345	350	353	360	365	366
White	451	448	446	444	442	442	444	443	445
MATH									
American Indian	420	421	419	421	426	425	424	425	427
Black	364	367	364	368	380	382	386	387	373
Mexican-American	410	408	402	410	413	415	416	417	420
Asian American	518	514	510	511	509	513	513	514	519
Puerto Rican	401	397	388	388	394	398	403	397	400
White	493	489	486	483	482	483	483	484	487

Source: 1976-82, in Howard Wainer, 'An Exploratory Analysis of Performance on the SAT,' *Journal of Educational Measurement*, (forthcoming), 1983 and 1984 from the *College Board, Press Release, March 1984.*

Table A-5. Earned Degrees Conferred by Institutions of Higher Education, by Degree Level: 1869-70 to 1983-84

School year	Earned degrees conferred				
	All degrees	First bachelor's	Profession*	Master's**	Doctor's
1869-70	9,372	9,371	(NA)	—	1
1879-80	13,829	12,896	(NA)	879	54
1889-90	16,703	15,539	(NA)	1,015	149
1899-1900	29,375	27,410	(NA)	1,583	382
1909-10	39,755	37,199	(NA)	2,113	443
1919-20	53,516	48,622	(NA)	4,279	615
1929-30	139,752	122,484	(NA)	14,969	2,299
1939-40	216,521	186,500	(NA)	26,731	3,290
1941-42	213,491	185,346	(NA)	24,648	3,497
1943-44	141,582	125,863	(NA)	13,414	2,305
1945-46	157,349	136,174	(NA)	19,209	1,966
1947-48	317,607	271,019	(NA)	42,400	4,188
1949-50	496,661	432,058	(NA)	58,183	6,420
1951-52	401,203	329,986	(NA)	63,534	7,683
1953-54	356,608	290,825	(NA)	56,788	8,995
1955-56	376,973	308,812	(NA)	59,258	8,903
1957-58	436,979	362,554	(NA)	65,487	8,938
1959-60	476,704	392,440	(NA)	74,435	9,829
1961-62	514,323	417,846	(NA)	84,855	11,622
1963-64	614,194	498,654	(NA)	101,050	14,490
1965-66	709,832	519,804	31,236	140,555	18,237
1967-68	866,548	632,289	34,421	176,749	23,089
1969-70	1,065,391	792,316	34,918	208,291	29,866
1970-71	1,140,292	839,730	37,946	230,509	32,107
1971-72	1,215,680	887,273	43,411	251,633	33,363
1972-73	1,270,528	922,362	50,018	263,371	34,777
1973-74	1,310,441	945,776	53,816	277,033	33,816
1974-75	1,305,382	922,933	55,916	292,450	34,083
1975-76	1,334,230	925,746	62,649	311,771	34,064
1976-77	1,334,304	919,549	64,359	317,164	33,232
1977-78	1,331,536	921,204	66,581	311,620	32,131
1978-79	1,324,047	921,390	68,848	301,079	32,730
1979-80	1,330,244	929,417	70,131	298,081	32,615
1980-81	1,335,293	935,140	71,956	295,739	32,958
1981-82	1,353,283	952,998	72,032	295,546	32,707
1982-83	1,370,200	970,000	72,500	295,000	32,700
1983-84	1,372,500	970,000	73,500	296,000	33,000

Note: Beginning in 1959-60, includes Alaska and Hawaii.

—Represents zero. NA Not available.

*From 1869-70 to 1963-64, first-professional degrees are included with bachelor's degrees.

**Prior to 1965-66, some master's degrees in fields such as library science and social work were counted as first-professional degrees and are reported in column 3.

Source: National Center for Education Statistics, *Digest of Education Statistics, 1982*, U.S. Bureau of the Census, *Statistical Abstract of the U.S.: 1984*, (104th ed.), Wash., D.C., 1983, p. 168, table 275. For 1982-83 and 1983-84, figures are preliminary estimates provided by Mr. Vance Grant of the National Center for Educational Statistics.

Table A-6. Enrollment in Institutions of Higher Education, by Sex, Attendance Status, and Control of Institution: 1948-83

(Figures in thousands)

Fall	Enrollment		Degree credit enrollment by sex			Degree credit enrollment by control			Total enrollment by attendance status		
	Total	Degree credit	Men	Women	Percent women	Public	Private	Percent private	Fulltime	Parttime	Percent parttime
1948	(NA)	2,403	1,709	694	28.9	1,186	1,217	50.6	(NA)	(NA)	(NA)
1949	(NA)	2,445	1,721	723	29.6	1,207	1,238	50.6	(NA)	(NA)	(NA)
1950	(NA)	2,281	1,560	721	31.6	1,140	1,141	50.0	(NA)	(NA)	(NA)
1951	(NA)	2,102	1,391	711	33.8	1,038	1,064	50.6	(NA)	(NA)	(NA)
1952	(NA)	2,134	1,380	754	35.3	1,101	1,033	48.4	(NA)	(NA)	(NA)
1953	(NA)	2,231	1,423	808	36.2	1,186	1,045	46.8	(NA)	(NA)	(NA)
1954	(NA)	2,247	1,563	883	39.1	1,353	1,093	44.7	(NA)	(NA)	(NA)
1955	(NA)	2,653	1,733	920	34.7	1,476	1,176	44.3	(NA)	(NA)	(NA)
1956	(NA)	2,918	1,911	1,007	34.5	1,656	1,262	43.2	(NA)	(NA)	(NA)
1957	(NA)	3,037	1,985	1,052	34.6	1,753	1,284	42.3	(NA)	(NA)	(NA)
1958	(NA)	3,226	2,092	1,134	35.1	1,884	1,342	41.6	(NA)	(NA)	(NA)
1959	(NA)	3,386	2,153	1,211	36.0	1,972	1,392	41.4	(NA)	(NA)	(NA)
1960	(NA)	3,583	2,257	1,326	37.0	2,116	1,467	40.9	(NA)	(NA)	(NA)
1961	(NA)	3,881	2,409	1,452	37.6	2,329	1,532	39.7	(NA)	(NA)	(NA)
1962	(NA)	4,176	2,587	1,588	38.0	2,574	1,601	38.4	(NA)	(NA)	(NA)
1963	4,766	4,495	2,773	1,722	38.3	2,848	1,646	36.8	(NA)	(NA)	(NA)
1964	5,280	4,950	3,033	1,917	38.7	3,179	1,770	35.8	(NA)	(NA)	(NA)
1965	5,921	5,526	3,375	2,152	38.9	3,624	1,902	34.4	(NA)	(NA)	(NA)
1966	6,390	5,928	3,577	2,351	39.7	3,940	1,988	33.5	4,439	1,951	30.6
1967	6,912	6,406	3,822	1,584	40.3	4,360	2,048	31.9	4,793	2,119	30.7
1968	7,513	6,928	4,119	2,809	40.5	4,892	2,036	29.4	5,210	2,303	30.7
1969	8,005	7,484	4,419	3,065	40.9	5,415	2,069	27.6	5,499	2,506	31.3
1970	8,581	7,920	4,636	3,283	41.5	5,800	2,120	26.8	5,815	2,766	32.2
1971	8,948	8,116	4,717	3,399	41.9	6,014	2,102	25.9	6,077	2,871	32.1
1972	9,215	8,285	4,701	3,584	43.1	6,159	2,106	25.5	6,072	3,142	34.1
1973	9,602	8,518	4,771	3,747	44.0	6,389	2,129	25.0	6,189	3,413	35.6
1974	10,224	9,023	4,968	4,055	44.9	6,883	2,185	24.2	6,370	3,853	37.7
1975	11,185	9,731	5,320	4,410	45.3	7,426	2,305	23.7	6,841	4,343	38.8
1976	11,012	9,589	5,049	4,540	47.3	7,275	2,314	24.1	6,717	4,295	39.0
1977	11,288	9,807	5,031	4,776	48.7	7,415	2,392	24.4	6,793	4,493	39.8
1978	11,260	9,790	4,913	4,877	49.8	7,365	2,425	24.8	6,668	4,592	40.8
1979	11,570	10,032	4,940	5,092	50.8	7,550	2,482	24.7	6,794	4,776	41.3
1980	12,097	10,454	5,088	5,366	51.3	7,873	2,581	24.7	7,098	4,999	41.3
1981	12,372	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	7,181	5,190	41.9
1982	12,426	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	7,221	5,205	41.9
1983	12,481	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	(NA)	7,261	5,204	41.8

NA Not available.

Source: U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics: 1982*, tables 81 and 82. Fall of 1981, 1982, and 1983 provided by Mr. Vance Grant of NCES.

Table A-7. Population 5 to 17 Years Old and 18 to 24 Years Old: 1960-2050

(Figures in thousands)

Year	5 to 17 years old	18 to 24 years old
1960	44,184	16,128
1970	52,529	24,455
1980	47,401	30,280
1983	44,668	30,055
1985	44,352	28,715
1990	45,123	25,777
1995	48,514	23,884
2000	49,782	24,590
2025	48,403	25,447
2050	47,148	25,659

Source: U.S. Bureau of the Census, *Statistical Abstract of the U.S.*: 1981, (102nd ed.), Wash., D.C., 1981, table 30; Bureau of the Census, Current Population Reports, Series P-25, #922, Oct. 1982, *Population Estimates and Projections.*

Table A-8. Mean Earnings of Male College Graduates (4 Years Only) and High School Graduates Who Were Year-Round, Full-Time Workers, by Age: 1979

(Figures in dollars)

Age	College graduate	High school graduate	Difference
19	(NA)	11,883	(NA)
20	(NA)	13,409	(NA)
21	(NA)	15,280	(NA)
22	13,846	17,385	-3,539
23	15,348	16,847	-1,499
24	18,539	17,755	784
25	20,683	19,723	960
26	22,046	19,723	2,323
27	21,680	20,610	1,070
28	23,505	21,494	2,011
29	24,824	21,782	3,042
30	25,684	21,508	4,176
31	27,942	22,306	5,636
32	28,553	24,106	4,447
33	30,096	23,749	6,347
34	30,013	24,695	5,318
35	32,272	27,108	5,164
36	34,618	26,858	7,760
37	38,451	29,705	8,746
38	38,185	27,876	10,290
39	38,988	27,497	11,491
40	34,500	26,729	7,771
41	34,809	25,819	8,990
42	34,895	24,614	10,281
43	35,882	27,226	8,656
44	41,940	26,763	15,177
45	37,641	27,415	10,226
46	37,833	27,304	10,529
47	38,181	27,705	10,476
48	43,132	28,373	14,759
49	41,984	29,307	12,677
50	42,448	26,860	15,588
51	43,999	30,166	13,833
52	43,009	28,003	15,006
53	43,107	26,179	16,928
54	43,358	27,061	16,297
55	41,389	25,790	15,599
56	40,747	27,358	13,389
57	40,509	26,597	13,912
58	42,836	26,160	16,676
59	37,537	27,755	9,872
60	41,258	26,819	14,439
61	42,519	25,257	17,262
62	41,877	26,452	15,425
63	41,409	26,261	15,148
64	43,813	26,779	17,034

Source: U.S. Bureau of the Census, Current Population Reports, Series P-60, #139, *Lifetime Earnings Estimates for Men and Women in the U.S.*: 1979, GPO, 1983, table B-1, p. 28.

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